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ON THE COVER: Before Charles Lindbergh became famous, he and his pal Bud Gurney were just two kids who loved to fly. We get a peek at the young Lindbergh (photo: San Diego Historical Society) through an interview he recorded in his friend's kitchen, p. 68.



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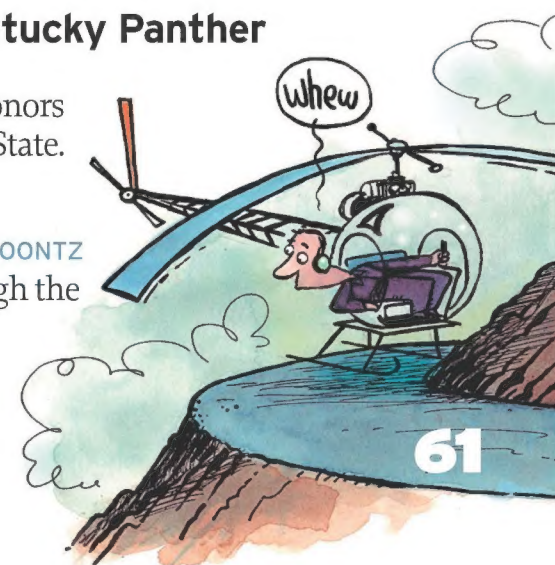
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More *Air & Space*! With every issue, you can find more information and photos supplementing features in the magazine. This month, read more stories of Bob Hope's USO travels (p. 22), and see more photos of the aircraft on display at the Museum's Steven F. Udvar-Hazy Center (p. 72).



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Child's Play

I HAD THE SAME PROBLEM building models that Bruce McCall admits to in his fine essay "Ode on a Canadian Warbird" (p. 50). I admire others who can do it, but I don't think I ever completed a whole airplane. I always broke them. Still, like McCall, I loved airplanes as a kid and still do.

I have the feeling that many readers will react to McCall's memoir just as I have. It made me remember my own childhood experiences with the warbirds of World War II. My dad was a Marine fighter pilot—he flew Corsairs—and I grew up on Marine Corps Air Station El Toro in southern California. Near our quarters was an ordnance school, and it had a Corsair for students learning how to load ordnance. The canopy was locked with a hasp and padlock, but I found a hatch in the belly just forward of the tailwheel. A 14-year-old—me—could wriggle up through the belly, push the floor boards up, and get in. One day I was in there "flying" when the ordnance officer came out and found this kid inside an airplane that had been secured with a canopy hasp and lock. I can still hear him yelling, "How'd you get in that airplane? Get outta there!" The next time I came, I saw that somebody had spot-welded that hatch.

When my dad was a group commander at the base, he had a Corsair parked outside his office. It was his airplane; his name was printed on it. By this time, I'd learned my lesson, and I would ask permission before I'd go out and sit in the cockpit. I later joined the Marine Corps to fly Corsairs, but by

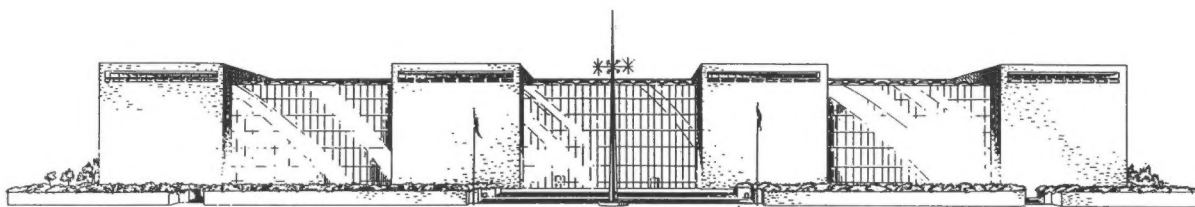
the time I was commissioned, they were being phased out. I never got the chance to fly the F4U, but I have a lot of hours sitting in one.

On display at the National Air and Space Museum, we have several of the airplanes that inspired McCall as a boy, including the Westland Lysander (see *In the Museum*, Dec. 2005/Jan. 2006). The man who restored and donated it, the late Dwight Brooks II, found it in a farmer's field in Alberta, Canada. I have to agree that it's "gawky," but it was good at what it did: inserting British spies into Nazi-occupied France on some of the most intriguing and perilous missions of the war.

I can only imagine what it was like flying from England, at night and low-level, without navigation aids, trying to find a field in France. That's tough enough to do in the daytime; it's the kind of landing you'd attempt today only in an emergency. Agents on the ground would light the fields with flashlights. It didn't take long for the Germans to figure that one out, and to trick the pilots, they'd put flashlights in front of concrete abutments. Maybe the mystique of World War II aircraft endures because of just such dangerous, desperate missions.

Read Bruce McCall's memoir. Then come see us at the National Air and Space Museum. When you walk around the warbirds on display, I guarantee they'll either trigger youthful memories or inspire admiration for the daring pilots of the Second World War.

■ ■ ■ J.R. DAILEY IS THE DIRECTOR OF THE NATIONAL AIR AND SPACE MUSEUM.





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You were right on the money about the flying tail making it possible to control the XS-1 through the speed of sound ("A Little Extra Oomph," Sept. 2009). Bell Aircraft Company built the capability of flying the XS-1 with the horizontal stabilizer, but it was Captain Jack Ridley, not Bell or the National Advisory Committee for Aeronautics, who made the system work. Captain Ridley was my classmate in test pilot school in 1946. Not only an outstanding pilot, Captain Ridley was also a brilliant engineer who, more than NACA or anyone else, was responsible for getting the XS-1 through the sound barrier.

General Chuck Yeager
U.S. Air Force (ret.)
via e-mail

Prop Comics at Work

"The Bear Is Back" (Oct./Nov. 2009) says: "No part of the rebuilt warbird escapes the team's attention," but the photograph at the top of page 44 showing the tiny propeller suggests someone was having a little fun, along with the hard work.

Mike Denlis
via e-mail

Rare Bear team manager Alby Redick explains: "A couple of our crew guys, myself included, are RC [radio-controlled] aircraft builders and fliers. That was an RC airplane propeller that we set on the airplane as a joke."

Near and Dear Misses

In 1980, when I was 10, my father went to work for Vought, which was trying to win the contract for the aircraft that would replace the Cessna T-37 as the primary trainer for the U.S. Air Force.

Vought also had a model aircraft department ("Martial Arts," Sept. 2009), and the company was kind enough to give my father one of the expensive

models of its NGT (Next Generation Trainer) proposal.

One day Vought had an open house, and families were permitted to visit the facilities in Grand Prairie, Texas, where my father worked. As we toured the aircraft design department, we saw a display table with many Vought aircraft models representing proposals that never made it past the model stage. My father jokingly called the airplanes lined up Losers Row.

Sadly, Vought lost the competition to the Fairchild T-46, and that beautiful model Vought had given my father became a part of Losers Row. Interestingly, the Air Force then cancelled the T-46, and the NGT concept was scrapped.

The Cessna T-37 soldiered on for about 20 years longer than planned.

Chris Black
Grapevine, Texas

"Martial Arts" brought to mind the Web site www.luft46.com, which describes concepts that German industry proposed for the Luftwaffe before World War II. Most never made it beyond the mockup stage.

Anthony T. Hughes
Schuylkill Haven, Pennsylvania

Besides the Jetwing ("Blown Away," Oldies & Oddities, Oct./Nov. 2009), the YC-14, a 1970s Boeing design, experimented with blown flaps. The intent was to create a cargo plane for the Air Force with a heavy-lift, short-takeoff capability. The company made only two before the program ended.

Darryl J. Van Son
Greenwood, Arkansas

Your articles on transitional aircraft ("Hot-Rod Helicopter" and "Tiltrotors for the Rest of Us," Sept. 2009) did not mention Vought's XC-142A, an experimental cargo plane whose wing, with four engines on it, would tilt for transition from horizontal to vertical takeoff and landing.

Hilliard Stone
Irving, Texas

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Inspired by Meteorites

"How the Spaceship Got Its Shape" (Oct./Nov. 2009) left out the contributions of the late Dean Chapman, an aerodynamicist at NASA's Ames Research Center in California from the 1950s to the 1970s. Chapman's studies of meteorite-like natural glass stones called tektites showed that some of the objects had become blunted as they entered Earth's atmosphere at speeds greater than terrestrial escape velocity. Some space historians, myself included, have linked Chapman's tektite work with the development of blunt-shaped spacecraft.

Lou Varricchio
NASA-Jet Propulsion Laboratory
Solar System Ambassador Program
Middlebury, Vermont

Fast Reactor

"Push-Button Flying" (Sept. 2009) states: "The autopilot was found only in slow-reacting airplanes such as airliners and bombers." I flew P-47N fighters in 1945 out of Iwo Jima; those were the only fighters with autopilots. The sensitivity could be adjusted for higher or lower reaction.

Hugh C. Dischinger
via e-mail

Doused Lightning

I am saddened that we must now speculate about retrieving the corroded hulk of a Lightning from the sea ("Can This P-38 Be Saved?" Oct./Nov. 2009) while a previously flyable and complete one sits corroding outside at McGuire Air Force Base in New Jersey.

A fiberglass replica, indistinguishable from the real thing, will not corrode in the harsh coastal climate, as the present one inevitably will.

Major Taylor B. McKinnon
U.S. Air Force (ret.)
San Bernardino, California

Let's Do Launch

"Maverick Geniuses" (Viewpoint, Sept. 2009) describes Robert Goddard at the first launch of his liquid-fuel rocket as standing with "a single assistant." Goddard's wife, Esther, and Clark University assistant physics professor Percy Roope were also there. Esther took movies, but the camera's spring drive ran down just before the event.

Arloe Mayne
via e-mail

Corrections

Oct./Nov. 2009 Above & Beyond: The byline of the author, Major Jonathan Knaul, should have included "OC" (officer in command) instead of "A/OC" ("acting officer in command").

Letters: Joseph Pasquini flew his sampling missions over Christmas Island, not Western and South Australia. We regret introducing the error during editing.

"The Shining": The photograph on p. 38 shows Eric Johnson, not Ray Martinez.

Moments & Milestones: The C-5A Galaxy made its first flight in 1968, not 1964.

Sept. 2009 "A Swimming Success": Gemini astronauts trained in the pool at the McDonogh (not McDonough) School for Boys.

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Lost Landmark

ANOINTING A STRUCTURE

with the designation “National Historic Landmark” usually guarantees that it will be around forever. But not always. Take NASA’s Full Scale Wind Tunnel at the Langley Research Center in Virginia.

The center finished construction of the 2.2-acre tunnel in 1931. During World War II, its two 4,000-horsepower wooden fans, capable of producing 120-mph winds, ran around the clock testing full-scale aircraft. After the war, engineers at the National Advisory Committee for Aeronautics (later NASA) tested everything from the



Mercury capsule to Boeing’s proposed supersonic transport. Because the facility played a pivotal role in advancing aeronautical research, the U.S. Secretary of the Interior designated it a National Historic

Landmark in 1985. Ten years later, after NASA decommissioned the tunnel due to “obsolete capability,” Langley leased the wind tunnel to Old Dominion University, which used it for teaching aeronautics

Langley wind-tunnel testing in 1938 led to a redesign of the Brewster Buffalo (left). Boeing’s Blended Wing Body (above) was the last aircraft tested in the tunnel.

and testing NASCAR vehicles. Ken Hyde, head of the Wright Experience in Warrenton, Virginia, tested his scratch-built Wright *Flyer* replica there in 2003.

Last September the wind tunnel blew its last breath, which over the years had weakened to 80 mph, testing the Boeing X-48C Blended Wing Body.

National Historic Landmarks Program historian Patty Henry says that in de-designation, an advisory panel analyzes the situation, and if there’s little hope of a structure’s long-

term survival, the board recommends to the Secretary that the designation be withdrawn. “The landmark designation is something we’re proud of,” says Langley spokesman H. Keith Henry. “But it’s just that the building is quite old, and as a tool it’s not an effective way to use our resources anymore.” Although the tunnel’s Depression-era steel frame rode out many storms, in 2003 Hurricane Isabel deposited three feet of water in the building, and three lesser storms have flooded it

since then. Today, its exterior walls shed asbestos, and the rising Little Back River lies 30 feet away.

Though Hyde and other users object to the facility's closing, Robert Ash, the tunnel's director for Old Dominion, is taking its January demolition with equanimity. "We're going to get flooded out in a short number of years," he says. "We were hoping to keep it operating a while longer," but the cost of flood-proofing far exceeds the returns the facility could expect.

PHIL SCOTT

UPDATE

Richard Whitcomb 1921 - 2009

THE FIELD OF AERODYNAMICS lost one of its most prolific contributors when Richard Whitcomb died last October 13, in a Virginia nursing home, at age 88 ("The Man Who Could See Air," June/July 2002). The multiple-award-winning high-speed aerodynamicist, who spent most of his career at NASA's Langley Research Center in Virginia, is responsible for the transonic area rule, which enabled relatively low-power jet aircraft to achieve supersonic speeds; the supercritical wing, which delays the onset of drag rise and allows airliners and bizjets a high yet economic cruise speed; and vertical winglets, which reduce vortex drag by 20 percent. Whitcomb requested there be no funeral; his ashes will be scattered over the Chesapeake Bay.



The Honor Is All Theirs

WHEN THE NATIONAL WORLD WAR II MEMORIAL opened in 2004, many of the veterans it honors were in their 80s and unable, either physically or financially, to make the trip to Washington, D.C. to see it. In May 2005, physician's assistant and retired Air Force captain Earl Morse of Springfield, Ohio, organized a group of volunteer pilots to fly 12 veterans from Springfield to Manassas, Virginia, and treat them to a tour of the capital city. More flights followed, and by year's end, 137 veterans had seen the memorial, and Morse had begun the nonprofit Honor Flight Network. The number of veterans on the waiting list soared, and Southwest and Pace airlines donated to Honor Flight the use of their idle aircraft. In 2008, Honor Flight had 71 hubs in 30 states, and some 11,000 veterans made it to Washington.

Honor Flight personnel arrange a welcome for veterans when they arrive at and depart from Washington's airports: Servicemen and -women (usually joined by enthusiastic bystanders) cheer as the veterans pass by. Courtney Dillard, manager of the student ambassador program at Ronald Reagan

Honor Flight flies thousands of veterans to Washington, D.C., every year to tour the World War II Memorial and others.

Washington National airport, and her fellow volunteers try to personalize receptions. When a 100-year-old female Army veteran arrived for a recent tour, Dillard had an entourage of young male soldiers escort her through the terminal. "She kept her eyes straight, her back straight, and a smile on her face. She was beautiful, it was beautiful," says Dillard. And the veterans often give as good as they get. "The Southern flights, those are the ones you watch out for," says Dillard. "You will be hugged, you will be kissed. There may be invitations, there may be a proposal."

Dillard recalls a man who arrived carrying a faded photo of a uniformed young man. When she asked if it was his wartime photo, "he said, 'That's a picture of my brother, who never made it back. I thought he might like the trip to D.C.'"

To find out more about Honor Flight tours, visit the Web site at www.honorflight.org or call (937) 521-2400.

MATT CUNNINGHAM

R.A. MAKLEY PHOTOGRAPHIC IMAGES

Call Sign: Century

AN ADVENTUROUS BUNCH of pilots celebrated Canada's 100th anniversary of powered flight last summer with a coast-to-coast flight that included 50 types of aircraft, from a Tiger Moth to a Czech Albatros jet trainer. Some 127 aircraft were signed up for the Cross-Canada Century Flight; the first of them departed Boundary Bay on the west coast for a 12-day trip to Baddeck, Nova Scotia, and others joined along the way. The destination was the same spot where J.A.D. McCurdy lifted the Aerial Experiment Association *Silver Dart* off Bras D'Or Lake in February 1909 and flew half a mile.

Pilots ranged from Air Canada Jazz captain Paul Irwin to his 14-year-old son, Dalton, with just 20 hours in his logbook. With Dalton's grandfather, Peter, a retired Air Canada captain, they made the trek in the family's 1950



Piper Tri-Pacer, serial no. 1. A Tiger Moth that joined the eastbound wave in Ontario likely took the most time to reach Nova Scotia.

An Ontario farmer gave Canada's centennial of flight a nod with a tribute visible only to fliers.

"With headwinds, they were probably getting a ground speed of 40 mph," says Anthony Nalli. "My [Cessna] 206 had to make one fuel stop between Brampton and Fredericton, New Brunswick. They had to make 10."

At journey's end, 70 aircraft landed in Sydney—a fair number were weathered out en route. Back in school, Dalton Irwin easily took top honors for What I Did on My Summer Vacation: "I flew across Canada."

GRAHAM CHANDLER

PUSHING THE BUDGET ENVELOPE

All I Want for Christmas Is a Shiny Martin-Baker Mk.2 Fully Automatic Ejection Seat *

ART HISTORIAN NICHOLAS BRAWER, who opened his Manhattan gallery about a year ago, says of his "industrial art" collection, "I do all the [refurbishing] work myself with a group of ex-Royal Air Force engineers in England, so you could literally stick that

ejection seat back into the Canberra [British bomber] and, with a new cartridge in the gun, use it again."

The collection focuses on military hardware, but includes brass luggage racks from British train carriages, vintage cocktail shakers, miniature mahogany yachts, and three-

foot-long binoculars from a Japanese battleship. Among his aviation artifacts, Brawer could claim the "table formed from the twin horizontal stabilizers of an ex-RAF English Electric supersonic interceptor ca.1959-62" to be his favorite. "I was so excited when I found that shot of the Lightning showing the horizontal stabilizers to perfection," he says.

A sampling of prices: Lightning desk, \$75,000; Yak 7/9 piston-engine table, \$35,000; Rolls-Royce turbojet fan blade mirror, \$14,000; Avro Shackleton propeller fin sculpture, \$12,000; cast aluminum Gloster Javelin desktop model, \$11,000. Visit www.nicholasbrawer.com.

*"You'll shoot your eye out, kid."

PATRICIA TRENNER



Left to right: An ejection seat would look at home in any surgical suite. An English Electric Lightning surrendered its tailplanes to create the desk below.



Yang Guoxiang

PEOPLE'S LIBERATION ARMY AIR FORCE PILOT

BORN IN THE REMOTE mountains of Yunnan Province, Yang struggled to get an education and went on to become a guerrilla, then a soldier in the People's Liberation Army, and ultimately a ground attack pilot. In the 1970s, when China developed the Qiang 5 supersonic attack aircraft, he was selected as a test pilot, took a lead role in the aircraft's development, and dropped a hydrogen bomb. Its detonation signaled the operational status of China's thermonuclear weapon.

Your first run was a misfire. What went wrong?

On December 30, 1971, I took off, and at 984 feet, I headed toward ground zero at Lop Nor, 186 miles away. Seven-plus miles from the target, I started a 45-degree climb, and at 3,936 feet I released the bomb. Nothing happened! The indicators on the panel showed the bomb still attached. There were three separate release mechanisms, of which two were backups. None of them worked. On my second approach I followed the same procedures, and the bomb failed to release. On my third approach, again the bomb would not release.

I was running short of fuel. I could abandon the aircraft by parachute and let it crash in the desert surrounding the Lop Nor site. I could crash-land someplace where it would harm no one. Or I could try to bring the aircraft back to base. I reflected on the time and effort that went into the

H-bomb project, and the great deal of money it cost the Chinese people, and I made my choice.

When I notified the tower that I was returning with the bomb, the evacuation siren went off. Everyone had to put on gas masks and scramble into the tunnels.

Your greatest concern about returning?

With the bomb hanging just four inches above the runway, there was a

possibility that it could explode on contact. Everyone at the base still remembers my name: I could have brought them Judgment Day.



I made a perfect landing.

When I shut down the engine, there was total silence. All personnel were in the tunnels. I could not leave the cockpit: There was no ladder for me to climb down from the fuselage. I called the tower for help. The tower people, who were angry that I had put 10,000 lives at risk, told me to work my way back to the tail and jump. Now that I had unexpectedly brought the bomb back, there were no service vehicles equipped with the required shielding. I sat out on the field a long while.

Yang in an operational Q-5 in 1980 at Weifang air base; with a MiG-15 in 1959 (below, left).

What caused the hang-up?

The release mechanism was kept in a heated area until just before it was mounted on the aircraft. When the aircraft climbed into the cold air, the sudden temperature change may have affected tolerances and prevented it from releasing.

And your next flight?

January 7, 1972. This time, when I released the bomb, it separated from the aircraft. I reversed course to get far away from the blast zone and activated shields to protect me in the cockpit. At 12 miles from ground zero, I saw a very big flash. The shock wave rocked me like a small boat in the ocean, and then I saw the mushroom cloud.

My name was kept secret until I was formally acknowledged in 1999, at a conference commemorating the success of the A-bomb, the H-bomb, and an artificial satellite, the most important projects undertaken by the People's Liberation Army after the founding of the People's Republic of China.

Interviewed by Bob Bergin through interpreter Zhao Gang. Read the complete interview at www.airspacemag.com.

In the Museum

STOPS ON A TOUR THROUGH AMERICA'S HANGAR

The Thursday Regulars

LOOKS AREN'T EVERYTHING. That's what curators probably muttered when the Curtiss-Wright Junior first entered the National Air Museum's collections in 1959. The petite aircraft had been part of an airshow act, its wings and tail sprinkled liberally with large polka dots. The fabric on its fuselage and the engine cowling had been removed, and it bore little resemblance to the sleek blue-and-silver airplane the Curtiss-Wright company had enthusiastically promoted back in 1931.

Over the years, the CW-1 patiently waited in the restoration queue at the Museum's Paul E. Garber Preservation, Restoration and Storage Facility in Suitland, Maryland, but something always happened to postpone its makeover.

Six years ago the airplane finally got its chance. And on most

Thursdays since then, an all-volunteer group has met to restore the sporty monoplane. From the beginning, the project was a challenge. "We started with a bunch of junk and made an airplane out of it," says Joe Fichera, who is heading the project.

Fichera, who began working for the Museum in 1969 and retired as a shop foreman in 1984, returned as a volunteer in 1996 to work on the Pitts Special S-1C, which took five years to restore.



When Fichera, along with volunteers Roger Guest and George and Cindy Rousseau finished the Pitts, NASM aeronautics curator Dorothy Cochrane suggested the Curtiss-Wright Junior as a successor. "Joe is a master restorer of antique and classic aircraft," says Cochrane. "It was a natural thing for them to do. Certainly we always knew we wanted to restore it. It really didn't look like a normal Junior, which was basically used to get people interested in flying."

The two-seat, dual-control, open-cockpit aircraft was cheap to operate, soon becoming one of the most popular flivver-type airplanes of the 1930s. By June 1931, in just over six months, 125 Juniors had sold, each priced at \$1,494 (about \$21,000 in today's dollars). Some 270 were built.

"We wanted to restore it back to the configuration and color to illustrate the popular appeal of the Junior's design," says Cochrane. The Junior (donated by Robert E. Maytag of the Maytag Company) "was initially very well received. Then the Depression really gripped the country and all lightplane sales went down the tubes," Cochrane explains. "The Travel Airs, the WACOs—they're bigger planes that cost a lot to buy, and they were more than what your entry-level pilot would want to handle. The whole idea of the lightplane movement was to be able to make a plane that appealed to just weekend pilots and sportsmen who didn't have a lot of money, and who didn't want to do a lot of training."

Pilot Melissa Courtney joined the restoration crew in 2003, and Karl Heinzl, a shop foreman who had retired in 2008, recently returned to help. The project must be finished by the end of 2009, when all work at



A Curtiss-Wright Junior carries its engine above the wing (top). An all-volunteer crew works on the Museum's Junior. From left: George Rousseau (by wing), Karl Heinzl (with cowling), Melissa Courtney (center), Joe Fichera (near tail), and Roger Guest (by prop).

ARTIFACTS

John Glenn Sat Here

CUSHIONING THE MERCURY crew during a bumpy launch and recovery, custom-made, form-fitting couches also helped the astronauts withstand the terrific G-loads of spaceflight – up to 11 times Earth’s gravity. Developed by NASA engineer Maxime Faget (of Mercury capsule, Gemini, and Apollo spacecraft fame), the couch is now on display at the Steven F. Udvar-Hazy Center in northern Virginia.



DANE PENLAND

Cushy job: During centrifuge training, John Glenn’s couch helped him hold up to the Gs.

Garber will cease as the shop prepares to move to its new home, at the Steven F. Udvar-Hazy Center in northern Virginia.

The first task: wings.

“The wings were in horrible shape,” says George Rousseau. “There was rot and breakage and old repairs. It would have been simpler to build brand-new wings, but that’s not a restoration.”

“There’s an easy way and a hard way, and we picked the hard way,” says Guest, who has been restoring aircraft at Garber for 13 years.

The airplane, which has had a number of owners, was damaged several times in the 1950s. “We’ll never know this,” says Guest, “but I think we got wings off of two different airplanes.”

“The ailerons were different,” explains Rousseau. “One had wood ribs in it, the other had aluminum ribs. One [wing] had a metal compression rib, and the other a wooden compression rib.”

The fragile wings were rebuilt according to the original blueprints, which were in the collection. “We put fabric on them,” says Fichera, “and we wet it down to get the wrinkles out of it. And when you wet it down, it tightens the fabric up. We’re standing around, talking about something else, and we hear this

horrible *crack crick crack crick*. And the back end of the ribs all broke. So we had to start all over again. We reinforced all the ribs on that wing, and then we decided we’d better reinforce them on the other wing, so we did, and we marked everything that is not original.”

The Museum’s CW-1 had been fitted with a 65-horsepower Lycoming engine; somewhere along

the way, it parted with its original Szekely SR-3-O engine, known for its temperamental qualities. “People would be flying along and the cylinder would come off,” says Fichera. “That can ruin your whole day.” The designers’ solution was to tie a steel cable around the cylinder heads. That would keep the cylinder from being thrown, and the piece from crashing back into the propeller.

In 1998, Ken Hyde of the Wright Experience in Warrenton, Virginia, learned Cochrane was looking for an original Szekely engine. He donated one for the restoration.

The volunteers, who have worked together for 13 years, are proud—and sad—that the Junior will be the last aircraft to be fully restored at Garber. “As a group,” says Rousseau, “this is our last hurrah.”

REBECCA MAKSEL

Visitor Information



Donald D. Engen Tower The Udvar-Hazy Center has an observation tower from which visitors can watch air traffic arriving at and departing from Washington Dulles International Airport. The only way to access the tower is via an elevator that rises 164 feet above the ground. The elevator can transport 15 people every five minutes.



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Adventures in the South China Sea

IN THE SUMMER OF 1999, I was part of the reservist crew from Naval Air Station Whidbey in Washington state, on our annual cruise in the western Pacific, with detachment sites in Misawa, Japan, and Kadena Air Base in Okinawa. We'd been alternating with our other VP-69 "Fighting Totems" aircrew, standing alerts for days on end.

"Standing alert" entails a little time in the airplane—a Lockheed P-3C Orion—to preflight and spool up computers and radars, then a lot of time back at quarters for 24 hours of sleeping, watching movies, doing laundry, ordering pizza, and generally lying about, all in the name of maintaining crew integrity and defending the Republic.

One morning, while it was still dark and a few hours before the alert airplane was turned over to another crew, someone knocked on my door and announced: "Get up, we got paged." Along with a few equally groggy members of Combat Aircrew One, I looked out to see who was guilty of such bad grammar, but he had already left. I got dressed, laced up my flying boots, grabbed my bag, and tumbled down the stairs to join the others at the crew van.

Standard operating procedure requires us to be in the air within an hour of getting a call; we were taxiing our P-3C UDIII Orion to Runway 5R with 12 crew on board, plus a Navy captain from the tactical support center who was coming along for the ride. We'd been dispatched to locate and track a Chinese submarine that someone had gotten a whiff of.

A four-hour transit put us on station in the South China Sea to relieve a P-3 that had been in intermittent contact with the sub. That crew lost track of it just before we arrived.

Before they left, they expended the last of their sonobuoys, which use

sound waves to identify objects underwater, for us to start on. We shut down an engine to save gas and feathered the propeller to reduce drag. Soon our sensor operator picked up the trail, and in no time had the sub boxed in. After the euphoria of contact calls, steep turns, high-speed dashes, rapid-firing strings of buoys, and reporting back to tactical support center once we had the sub cold, we settled into the tedium of



anti-submarine warfare: hours and hours of circling, laying down buoys, and watching lines on a scope. It was hot and muggy at these latitudes, so I stripped my flightsuit down, tied it around my waist, and put my survival vest on over my soaked T-shirt. Outside my starboard aft cabin window lay a blanket of fog 200 feet thick.

As ordnanceman, my job was to keep the tactical coordinator supplied with sonobuoys armed with impulse cartridges and set to the depth, radio-frequency channel, and operational lifespan he would need when it was



The author, his anti-sub Lockheed Orion, and what is possibly the world's crummiest cruise patch.

time to launch them from the three pressurized sonobuoy chutes in the cabin floor. We'd tracked and classified the sub—now we just had to stay in contact until we too were relieved. We were operating at 200 feet, our normal anti-sub altitude. Then, over the intercom system: "Flight, I think he may be coming to the surface."

Jez, the radar operator, confirmed a contact, possibly a periscope. In short order we had the surfacing submarine just off the nose one mile away, invisible in the thick fog.

"Smut, get up here with the camera."

Most of us who fly naval aircraft acquire a nickname. They have a place in tactical aviation under combat

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conditions, but despite what you see in the movies, rarely are they flattering, cool, or macho. Early in my naval career (and for reasons I care not to discuss at this time) I had the misfortune of being nicknamed “Smut.” It could have been far worse: They could have named me Ears, or Mr. Potato Head.

Another duty I had was to take pictures with the Agiflite 70-mm camera. I already had the camera loaded with a fresh film magazine and new batteries. As I scooted up to the flight station, I handed a super-8 camcorder to Zim, our inflight technician, so he could get some video if we broke out of the fog. I took my seat at the optical-glass camera window behind the pilot.

The along-for-the-ride Navy captain was flying the airplane. I didn’t doubt his flying ability: I simply did not know him, and flying a real-world tactical mission over a Chinese sub, in and out of fog at 200 feet with one engine shut down, was not the time or place to become acquainted. Just sayin’.

Jez called out distance and steering commands to the contact. Getting imagery of a surfaced Chinese sub would be a coup for our squadron, and would have made working in a steamy airplane with no air conditioning and no food on board almost worth it.

Our first pass showed what we’d known all along: This guy was in the fog. We were never going to see him. Another pass. Jez called “Now now now!” as we zoomed over the invisible sub, and all of us strained to see through the thick fog. Nothing. Regulations did not allow us to go lower than 200 feet. Should something go horribly wrong, the time to impact would have been seconds. I’d have no time to make it to a ditching station and strap myself in before cartwheeling into the drink, which I had heard was shark-infested.

On the next pass, the captain dipped below 200 feet. We all shifted uncomfortably. As I watched the radar altimeter over his shoulder tick down to 190 feet, the altitude alarm blared its little tune. The altimeter warning lights on the glareshield started flashing big, bright, and red, and this guy was holding us at 190 feet. Unbelievable.

“On top, now now now!” Jez called. We nudged up to 200 feet and everyone started breathing again. Then the captain stood the big Orion on its right wing and racked into a turn for another pass. Again he flew us across the sub at 190 feet. Another turn—this time down to 180 feet. The alarm blared, lights flashed, hearts pounded. The captain glanced at the flight engineer, nodded toward the circuit breaker panel, and grunted. The flight engineer held my gaze momentarily—I could read in his eyes

meals. The coffee was long gone, as was the last of the stale corn chips someone had passed around. We were exhausted, sweaty, filthy, and hungry.

Then the fighters showed up.

I was dozing in my chair when somebody hit me in the leg. “Hey man, we’re being intercepted!”

Crap! I pulled on my headset, peered into the blackness, and saw the flashing strobes of a fighter a mile off our right wing. Our Chinese friends had scrambled interceptors, and they’d been tracked

At 170 feet I could almost see the color of the eyes of the three People’s Liberation Army (Navy) crew in the sub’s conning tower looking up at me. I can still see the white position light on the stern and the water foaming on the sinister black hull as we zoomed overhead.

just what he thought of the situation. He reached over to pull the radar altimeter warning circuit breaker, silencing the alarm and extinguishing the red lights that people far smarter than us saw fit to place there for very specific reasons.

Screaming along the deck, I suddenly saw a churning wake. “I see him!” I squealed as I brought the camera up. Just as I squeezed the trigger, the sub came into view.

At 170 feet I could almost see the color of the eyes of the three People’s Liberation Army (Navy) crew in the sub’s conning tower looking up at me. I can still see the white position light on the stern and the water foaming on the sinister black hull as we zoomed overhead.

“Zim, did you get him?”

“Oh yeah, I got him!” The Agiflite required film processing, but the camcorder was right now. We passed it around the cabin and watched the few seconds of footage. We’d scored big for our squadron, the U.S. Navy, and the Republic. We climbed to patrol altitude and continued to track the sub with radar and the occasional buoy until it was time to head back to Okinawa.

By now we were all dreaming of food. We’d not had anything to eat since dinner the night before, close to 24 hours ago, and I am not one who misses many

coming after us. The two fighters in close formation a few feet from the window were in fact Japanese F-4 Phantoms that had come to deal with the threat, but we’d not sorted that out just yet. The Phantoms escorted us toward friendly airspace, but it was a very tense few minutes waiting for the communist missiles to arrive. This was the same area in which a Chinese F-8 Finback fighter would collide with an EP-3 Aries II—the electronic reconnaissance version of our airplane—less than two years later.

When we finally landed at Kadena, the total elapsed time since the knock on the door was just under 23 hours. The duty driver was waiting in the van to take us back to quarters. When we climbed in, she wrinkled her nose, and in her lovely Georgia drawl said, “All y’all smell like a bunch of billy goats.”

We drove to the other side of the base in fetid silence. Without prompting, she pulled into the Popeye’s Fried Chicken. We all sat together, stinking and eating the piles of chicken. No one said a word.

Later, in a bar in Okinawa, we came up with ideas for the traditional cruise patch. It’s a circle (sort of) with a misshapen number 1 (our crew) and an odd silhouette of the Chinese sub. The quality is horrible, the stitching is falling apart, but it’s still my favorite.

 TRACY WILKINSON

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WHIMSY, NOSTALGIA, AND JUST PLAIN MISCHIEF

Like Father, Like Daughter

THERE ARE TWO KINDS of people in the world: Those who look up, reflexively, whenever they hear an aircraft engine, and those who don't. My seven-year-old daughter Addie appears to be in the latter category. As a member of the former, I have been hoping that as she grows up, she'll share my interest in airplanes.

I thought a total immersion might help, so I took her to her first airshow, the 2007 Kansas City Aviation Expo. Extra added bonus: I knew a B-2 flyby was scheduled. I had once seen one on static display, but never a flyby.

As we made our way through the main gate, an F-15 was making low passes, afterburners on full. "Dad, Dad, there it is!" she shouted as it flashed behind hangars. As soon as we were in, she saw a FedEx freighter with its cargo door open. "Dad! Let's go in there!" Addie mostly wanted to play on the rollers embedded in the

cargo area floor, as if she were skating. Okay, this was fun, but I wanted her to see actual flying airplanes. But after 15 minutes: "Dad, can we go home now? I'm hot." I checked my watch: another hour until the B-2 flyby.

We killed some time wandering around the static displays, and I pointed out something interesting or appealing about each one. A smoke-generating aerobatic lightplane briefly caught her attention, as did a thundering 300-mph jet truck. By now, the B-2 was just minutes away.

Addie spotted a C-130 with its cargo ramp down. I tried to convince her to look at a V-22 Osprey parked nearby, which I had never seen up close, but Addie insisted on the Herc. A line snaked out the back, so I figured we'd still be outside when the B-2 appeared.

Let me explain my relationship

with the C-130. A fine airplane it is, but between the many airshows I've attended and visits to my father's base on his Air National Guard weekends, I had been in and out of a Hercules about 12,000 times. I most assuredly did not want to miss the B-2 for another walk through the spartan interior of a C-130.

Of course the line moved fast, and we were soon just inside. The crowd outside began to stir, arms pointing up, and the jet roar began to build. I grabbed Addie like a sack of grain and ran outside in time to see the B-2 make a level pass. It then looped across the far end of the field, returned for a banked pass, rolled out the opposite way—and disappeared. Was that it? No one seemed to know, and Addie was getting antsy. So before the line had completely reformed, we went back in the C-130. This time Addie made friends with another child.

Suddenly the roar echoed overhead. "Addie, the Stealth is back—come on!" I pleaded.

"But Dad, I really want to see this!"

"This" being the cargo netting on the wall. *ROAR*. Another pass. Now it was the jump seats lining the wall. *ROAR*. The controls that operate the cargo door. *ROAR*. The flip-down toilet on the bulkhead behind the cockpit. *ROAR*.

By the time we made it into the cockpit, I looked through the windscreen and could just make out the B-2, leaving for sure this time. *Oh well*. But Addie was having the time of her life, pulling on the yoke, flipping switches (under the watchful eye of a crew member), and pretending to fly.

That's my girl.



The author's daughter, spellbound by a Hercules C-130, had little interest in the B-2 bomber that was entertaining an airshow crowd at the moment the photo was snapped.

DAVID UNEKIS

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It happened on our last trip to South America. After visiting the "Lost City" of Machu Picchu in Peru, we ventured through the mountains and down the Amazon into Brazil. In an old village we met a merchant with an impressive collection of spectacular, iridescent emeralds. Each gem was tumbled smooth and glistened like a perfect rain forest dew drop. But the price was so unbelievable, I was sure our interpreter had made a mistake.

But there was no mistake. And after returning home, I had 20 carats of these exquisite emeralds strung up in 14k gold and wrapped as a gift for my wife's birthday. That's when my trouble began. She loved it. Absolutely adored it. In fact, she rarely goes anywhere without the necklace and has basked in compliments from total strangers for months now.

So what's the problem? I'm never going to find an emerald deal this good again. In giving her such a perfect gift, I've made it impossible to top myself.

To make matters worse, my wife's become obsessed with emeralds. She can't stop sharing stories about how Cleopatra

cherished the green gem above all others and how emeralds were worshiped by the Incas and Mayans and prized by Spanish conquistadors and Indian maharajahs. She's even buying into ancient beliefs that emeralds bring intelligence, well-being and good luck to anyone who wears them. I don't have the heart to tell her that I'm never going to find another deal this lucky.

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HE STARRED IN the Ziegfeld Follies with Fanny Brice and Josephine Baker in the 1930s, traveled the Vaudeville circuit as one half of a dancing team, and made more than 60 movies, including seven *Road* pictures with his pal Bing Crosby. But what most people remember about Bob Hope is that he entertained U.S. troops with annual USO tours in war zones all over the world.

"Along about September each year," Hope wrote in his 1966 memoir, *Five Women I Love*, "that tingle in the air is not the first sign of autumn in the San Fernando Valley. It's the annual stirring among my staff concerning where the Defense Department is sending us this year. Each summer the Joint Chiefs of Staff gather with the U.S.O. and commiserate, 'He got back okay last Christmas...okay, let's try harder.' Then they drop little pieces of paper listing all the world's trouble spots into a hat, and humming choruses from *Macbeth* they stir gently."

Hope performed his first radio show for servicemen in March 1941 at an Army Air Corps base at March Field in Riverside, California, and for the next 50 years he took his show to some of the world's most dangerous places. He ducked air raids in Italy and Algeria during World War II. During a 1964 visit to Saigon, a Viet Cong truck bomb intended for Hope exploded 10 minutes before his troupe arrived at their hotel. "A funny thing happened as we arrived in Saigon," Hope later joked to the troops. "I met my hotel going the other way."

When he wasn't visiting bases or aircraft carriers, he was entertaining the war-wounded in hospitals. Over the years, under the auspices of the United Service

Organizations, Hope reached hundreds of thousands.

But his trips required extensive planning, and they couldn't have been carried out without the help of pilots and navigators, wing duty officers and mechanics, crew chiefs, and many others. Here are a few of their stories.

Alaska, 1942

Retired Air Force Colonel Robert Gates flew Hope to Alaska and the Aleutians for the first-ever USO show. He also flew Hope to shows in Europe after World War II, and to Vietnam in the 1960s. Gates spent more than 30 years in the Army Air Forces and Air Force, serving in Europe during World War II as

walked into the Officers' Club, and lo and behold, there was Bob Hope with Frances Langford, and Jerry Colona, and Tony Romano the guitar player, and an Army captain. And I introduced myself, and Bob says, "You're gonna fly us?"

I said, "Yes, sir."

And he said, "How old are you?"

I said, "I'm 22."

And he said, "You still got growing pains!"

And that was my nickname until about two months before he died [in 2003]. That was my nickname through 60-some years.

Nobody flew at night [in Alaska] because there were no radio letdowns [and navigational beacons] to speak of, except at Fair-

banks and Anchorage, and at Elmendorf [Air Force Base]. So we went over to Valdez, the main port for Alaska.

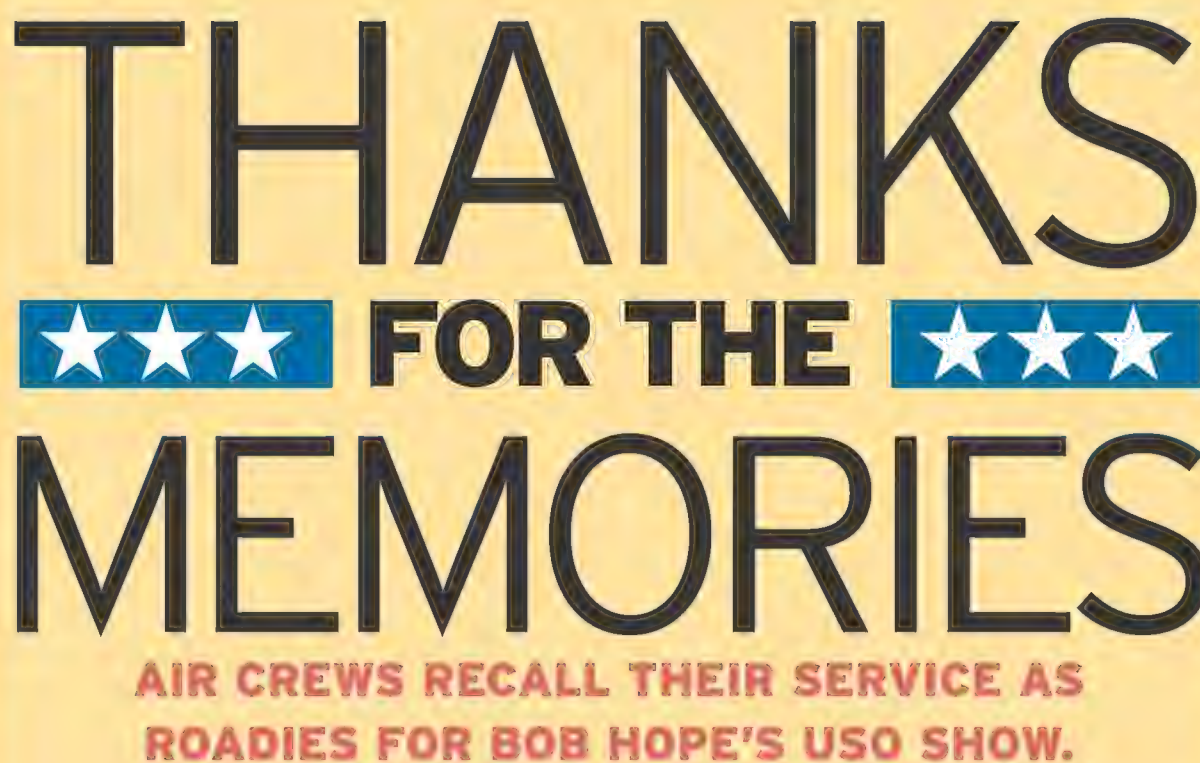
Bob did a show at about three in the afternoon for about half of the 600 or so servicemen who were there unloading the ships. And we were just ready to leave when the commander said, "Mr. Hope, only half of my troops got to see your show. Couldn't you do another one now?"

And Bob says, "Of course we can!"

And I said, "Bob, no we can't. We can't fly at night up here. We can't go back tonight."

"Oh, sure we can," he says. "It's only an hour and a half over there. We can do that."

So we did the show, and got back to the airport at about 9 p.m., and it's raining. And the mountains are 12,000 feet high there. So we did a tight turn at 12,000 feet through the rain and started on course, and we got into the ice and one engine quit. And then the radio went out. So there we were, the mountains higher than we were, losing altitude about 200 feet a minute, and how we got through is beyond me to tell you, other than God was looking out for us.



by Rebecca Maksel

a troop transport pilot for the 101st and 82nd Airborne. In 1985, Gates and Hope helped establish the Bob Hope Village, a retirement community in Shalimar, Florida.

In 1942, we went down and checked out in the admiral's airplane—a Lockheed Lodestar C-60—in Kodiak, Alaska. And the general said to me, "You've got to go and pick up the admiral's airplane and go up to Fairbanks and pick up a USO show."

I said, "What's a USO show?"

He said, "We don't quite know, but we think it's a bunch of entertainers, and they have top priority, so take good care of them."

So we arrived at Fairbanks and we



LEFT: EXPRESS/GETTY IMAGES; BELOW: COURTESY OF JAMES MOCK

I remember Bob coming up and tapping me on the shoulder and saying, "Everybody back there is praying."

I said, "You tell 'em don't stop!"

The commander of the 11th Air Force had sense enough when they couldn't contact us to turn on all the search lights, and point them to this same point in the sky over Elmendorf. And on our arrival, as we were letting down at about 6,000 feet, we saw the glow in the murk in the sky, and let down on that and landed.

We couldn't taxi, we were all iced up, and had only one engine. So all the generals come rushing out of there, and the

Where there was war, there was Hope and his showgirls: Jill St. John (above, on fuselage) and Ann Sydney join him on his first visit to Vietnam in 1964. Right: Hope greets his 1962 pilot, James Mock.

base commander and so on, and they were thanking Bob for a safe trip and everything, and I was the last one to come out of the airplane. And Bob put his arm around me and said, "Okay, now let's go to the barracks and change our drawers." And that's how we became the best of friends.

When I met him, at age 22, it changed my whole life.



Far East, 1962

James Mock was a member of the California Air National Guard in 1962 when he was asked to fly Hope and his troupe to various U.S. military bases in Asia. His military flying career had started in the Missouri Air National Guard, where he flew B-25s, B-26s, and RF-84Fs.

After leaving the military, Mock spent 37 years with TWA, retiring as a 747 captain. In 1995, he purchased the Caravelle Theater in Branson, Missouri. Bob Hope would perform his last live stage show at the Caravelle later that year.

I went to TWA in 1953 and flew Martin 202s and 404s, and DC-3s, and then I took military leave and went into the Air Force. I thought you had to be an Air Force pilot—or Navy, or Marine—to make your mark in the world.

When [the Department of Defense] needed someone to fly Bob Hope [in 1962], I was just off active duty Air Force for the Berlin Wall crisis, was a flight commander, a Boeing C-97 instructor, and I knew the routes, so they asked me to do it.

We started from Van Nuys [airport] and went to Japan, and started flying all through the Air Force bases in Japan, Korea, Tai-

Hope also entertained Stateside. Above: Col. Glenn Griffith welcomes him to Peterson Air Force Base, Colorado. Below: Lt. Col. Bob McDaniel (fifth from left) flew Hope to Berlin for his 1990 USO TV special at the Berlin Wall.



wan and the Philippines.

We were flying a C-97 [Boeing Stratocruiser]. That airplane is built on the same chassis, you might say, as a B-50 or a B-29, but with bigger engines, so it has a huge cargo bay. The plane was a little bit VIP, but the main thing is that we had the cargo bays stacked with mattresses so Bob could crawl in there for the long, long flights. He'd come out and he'd smile and say, "Well, I'll just slap my wrinkle cream on and we'll be ready to go."

It was an unbelievably complicated airplane. They had the biggest engine we had ever built at that time; it was the same engine [a Pratt & Whitney R-4360] that was on the [Convair] B-36. The Air Force told us: "You'll never finish the trip." The

C-97 has 28 cylinders, four rows of seven cylinders, and 56 spark plugs per engine, every one wanting to go wrong.

Well, we made up our mind we had to do it, so we took engines that were neither new engines nor old engines, they were right in between—they were kind of proven a little bit. We kept them running, and the trip worked out.

At Subic Bay [in the Philippines] Bob did a show on the flight deck of the *Kitty Hawk*. Well, when we got to Cubi Point, that's a small base with small airplanes. They didn't have a tug big enough to move that big C-97, so we had to reverse it. You could reverse for 30 seconds, and then you had to stop so you didn't bake the ignition harnesses. Then you had to stop yourself with your forward thrust, and you were very, very careful that you didn't tip it over on its tail. It was a little tricky, but we backed it in to where if you've got the right camera angle, it looks like the airplane was sitting on top of the carrier deck.

I loved to watch Bob. I couldn't get enough of his shows. The magic came in the effect it had on the audience.

Bob gave his very last live show here at our theater, the Caravelle. His daughter, Linda, says, "Jim, you've got to stick with Pops because he can't see, and he'll walk right off [the stage] and break his neck." I was *trying* to stay right with him, but he was kind of fidgety, you know, and he said, "Now Jim, don't worry about me. Just tell me: Is that Anita [Bryant] out there?" And I said, "Yes, Bob, that's Anita." And he said, "You just stand back and watch my smoke." He walked right to her, and that's when they did their wonderful last show.





At 87, Hope still tried to make everyone laugh, even these East German guards in Berlin. His visit followed the fall of the Berlin Wall by six months.

South Vietnam, 1964

Thomas Anderson was a 34-year-old major commanding the 62nd Aviation Company "Outlaws" at the time of Hope's 1964 Christmas show in Vinh Long, South Vietnam. After the Vietnam War, he worked at the Pentagon, retiring from the Army Materiel Command in 1976. Today he helps manage the Vinh Long Outlaws Association.

On December 17, 1964, the 13th Battalion headquarters notified me that Bob Hope was coming to Vinh Long Army airfield on Christmas Day. The show was initially scheduled to be held in Can Tho, headquarters of the 13th Aviation Battalion, but the battalion commander, Lieutenant Colonel J.Y. Hammack, recommended that the show be held in Vinh Long, partially because it was rather isolated in the rice paddies of the Delta and could be better secured.

We were thrilled. I had to keep it fairly quiet because of the sensitivity of the visit, but I did bring into the security arrangements my executive officer, Captain Al Iller, and of course Major George Derrick—both of us commanded UH-1 "Huey" helicopter companies there at Vinh Long.

What made for some high anxiety was that on Christmas Eve we were deployed on a combat assault mission north of Saigon, near the Cambodian border. I was afraid that we wouldn't get back in time for the show. It turned out to be one of the largest helicopter airlifts up to that time in the conflict. About 165 helicopters

The fast-stepping Nicholas Brothers (Fayard, left, and Harold) give Hope some pointers aboard the *Ticonderoga* in 1965.

"It's not generally known that I have over a thousand hours' air experience. I got it filling tires at a service station."

from seven companies were involved—the helicopters formed a miles-long column in the sky. After a 50-minute flight, still in formation columns, the aircraft made their initial assault landings in two pre-designated landing zones near the Cambodian border. Additional ARVN [Army of the Republic of Vietnam] troops were then picked up at nearby staging areas and several more assault landings were made. By this time, all aircraft were running low on fuel.

Because the operational area was so remote, regular fuel trucks couldn't be used. Instead, we had to refuel from 55-gallon drums in the staging area. It took about three to four hours to get all these helicopters refueled because they had a hand pump on each one of these drums. The aircrews were first told at the refueling point that Bob Hope would be performing at Vinh Long at 1300 hours that day.

I had plenty of time because I had determined that I would be the last one to



LEFT: DEPARTMENT OF DEFENSE; ABOVE: COURTESY OF BOB MCDANIEL



DEPARTMENT OF DEFENSE

leave, to make sure that everybody else got off. We decided to strap red- and green-color-smoke grenades to the skids of the helicopters. We were the last two ships to get back to Vinh Long, arriving just after Bob Hope's C-123 landed. The crew chiefs pulled the cords and popped the pins on the smoke grenades and did about two circle passes over the top of Hope and the group.

After we landed, Hope said, "Do you have a place where I can sit down for a couple of minutes?" I took him to my quarters, and while we were sitting there chatting, he said, "You know, I usually have a

Gulf of Tonkin, 1966

When Hope visited the USS Bennington in 1966, Captain Richard Graffy was the carrier's commanding officer. He retired from the Navy in 1969 and spent a number of years building houses and doing blue-water sailing here and there, including the turbulent South China Sea. He now lives in Virginia.

While transiting from our home port of Long Beach, California, to the Gulf of Tonkin in the late summer of 1966, the ship received a message from Pacific Fleet headquarters requesting whether the *Bennington* would be interested in staging the

the audience of several thousand spectators would be on the flight deck.

Prior to arriving on the *Bennington*, the Hope show entertained some groups of soldiers and Marines ashore in Vietnam. The Les Brown Band had instruments, and all the cast had personal luggage well beyond the capacity of the *Bennington's* helicopters to transport. Instead, the show was airlifted by means of either Army or Marine transport helicopters from Da Nang. They had insufficient range to reach the carrier in its assigned operating area at Yankee Station [the location for aircraft carrier operations], so it became necessary to improvise.

Following an aircraft launch and recovery around noon, the ship steamed west at flank speed to intercept the helicopters that had launched from Da Nang. After unloading and refueling, the helicopters headed back, while the ship returned at flank speed to its operating area in time to launch a new flight and recover the previously launched aircraft. I doubt if any fighter aircraft escorts were used, since it was rather well established that the U.S. Navy pretty much "owned" the Tonkin Gulf below the 17th parallel.

The usual scheduled flight ops were conducted immediately before and after the show.

[After the show,] Phyllis Diller was invited to the bridge of the ship to view nighttime aircraft catapult and recovery

"We had a great trip over here, considering the plane we came in on. We flew here on a BC-135. That's not the model number, that's the year. It's one of the earlier jets. Instead of afterburners, it has an oven and a bag of charcoal."

golf club with me. You wouldn't have a golf club handy, would you?"

I said, "No, we've had to close the Vinh Long Country Club for the duration."

Bob Hope made eight more trips to Vietnam in later years, sometimes playing to as many as 12,000 troops. But I'm sure no performance could be more memorable than that Christmas Day show in a dusty little Mekong Delta airfield before 400 troops in the Vinh Long compound.

Bob Hope Christmas show for that year.

I'm not sure why the *Bennington* was chosen rather than one of the two other carriers in Tonkin Gulf at the time. I can only surmise that since we operated on a three-and-a-half-hour cycle (for launch and recovery of aircraft), as opposed to the other carriers' one-and-a-half-to-two-hour cycles, that may have played a part. The show had to be staged on the flight deck and conducted between air ops cycles since



DEPARTMENT OF DEFENSE

Actress Ann Jillian (opposite) joins Hope in a duet on the *Forrestal* in 1984. Two years later, comedian Jonathan Winters plays a pilot-wannabe on the *Lexington*.

operations. She asked about the array of telephone handsets surrounding the captain's chair on the bridge that connected directly to some of the more important stations on the ship. She singled out the one that connected to the captain's plot where the surface navigation was maintained, and was manned 24/7. It was suggested that she call and ask for the correct time, which she did. She was told it was 22:45:52, to which she replied, "Dammit son, I asked for the time, not my physical measurements!" followed by her signature cackling laugh.

Diego Garcia, 1972

Ronald Ronning was a 19-year-old Seabee electrician third class on the Navy communication station at Diego Garcia in 1972 and 1973. After returning to the States, Ronning went into the Army as a combat engineer, eventually training

"I had an idea we were going to a strange base when the pilot threw away the map and took out a Ouija board."

National Guardsmen. He is now mayor of Appleton, Minnesota.

They had draft numbers in those days, and my father called me one day and said, "You've got number 7." I said, "Are you sure it isn't 277?" So I said, I'm going to join the Seabees because I'm an electrician. I went to the recruiter, and he said, "You don't want to go into the Seabees, you'll end up on this little island in the Indian Ocean, that little island right there," and he points to it on a map. I said, "No, of all the places in the world, I'll never go there." So where's my first tour? *Diego Garcia.*

I think it was 115 degrees every day, and humid. I was an electrician there, lighting the runway. We had an airstrip, but it was 4,000 feet long and was for C-130 cargo transports.

We wanted Bob Hope to come to Diego Garcia. And we needed 2,000 extra feet on the runway—a total of 6,000 feet was needed for a C-141 jet. We worked 24 hours a day for two or three weeks. A thousand Seabees were on that island and they hadn't seen a girl for six months. So that was our incentive. Bob Hope's jet was the first to land on Diego Garcia.

We had regular runway lights, portable, which had rubber cables running all along the side of the runway. We'd plug them in, and the runway strip would be red at one end and blue on the other. There were nights when we couldn't get the lights on. You'd throw the switch and nothing would come on.

It was like a sea of red crabs on the runway all the time, like a swarm. They would pull apart the lights on the runway and the planes couldn't see to land, and we weren't within 1,000 miles of anything—you couldn't land anywhere else. The planes would be ready to run out of fuel in the air.

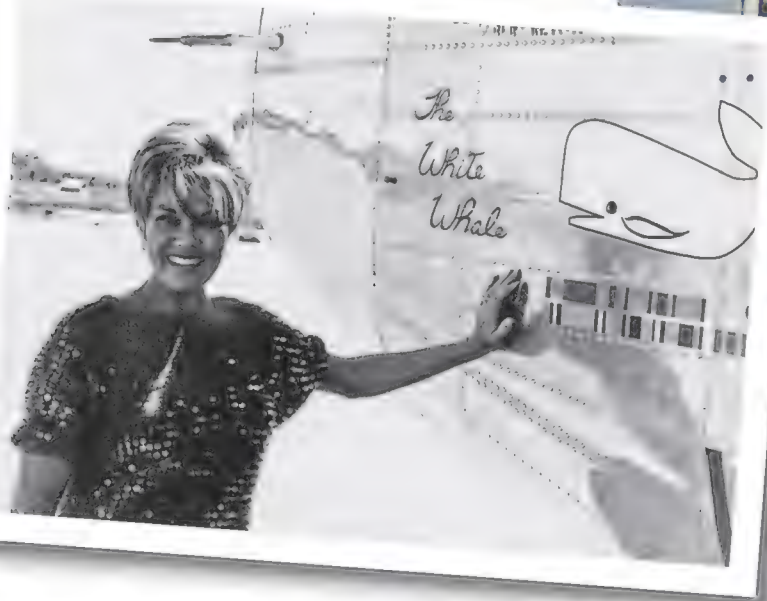
Many nights they would tell us the lights were out. I don't know if you've ever watched the movie *Hatari!* with John Wayne, where he [hunts rhinos] from a little chair mounted on the hood of a truck. We had a chair on our truck, and I would sit in it, and we used to tear down that runway at 50 miles an hour, trying to find the break in the cable lines so the planes could land.

The Bob Hope show was probably the highlight of my tour. I got to sit in the front-row seat because the runway crews worked all night keeping the crabs off the runway.



LEFT: COURTESY OF GARY ARNEY AND WINSTON PELFREY; OPPOSITE: COURTESY OF TOM ANDERSON

A Fairchild C-123 (with singer Janis Paige) nicknamed the "White Whale" ferried Hope in Vietnam in 1964. "Judging from the patches, it had been harpooned quite a few times," he joked. Above: Another carrier's banners.





COURTESY OF BOB HOPE LEGACY

The entertainer was the only person to be designated an honorary veteran of the U.S. armed forces by an act of Congress.

Spain, 1987

The 57th Military Airlift Squadron at Altus Air Force Base in Oklahoma transported Hope and his troupe in 1987, and Major Philip "Hawkeye" Pierce was the third pilot on the crew. Today, Lieutenant Colonel Pierce is director of operations of the 89th Airlift Squadron, 445th Airlift Wing, at Wright-Patterson Air Force Base in Dayton, Ohio.

We generally supported all the USO tours with [Military Airlift Command] airplanes, so it was appropriate for us to step up and fly Mr. Hope around the world for that particular mission.

We had two [C-141] aircraft. Both airplanes functioned perfectly.

The big hiccup was trying to get into the Azores, into Lages. We couldn't land there. There were 50-knot winds, but they weren't just 50-knot winds, they were ac-

tually crosswinds. At the time, we could only go up to a 25-knot crosswind [in the C-141]. So we were really getting buffeted. We were able to loiter overhead long enough for Mr. Hope to talk to the folks down there via the radio.

"We're awfully glad they slid the island under us when we dropped in. I'd like to thank all of you for inviting us here, and the flies for giving us permission to land."

Due to the incredibly bad weather, we had to divert to Rota Naval Air Station in Spain, where we put on an impromptu show. We showed up unexpectedly, but boy, did they ever pack the theater at midnight. When the word spread that Bob Hope was showing up, people came out of the woodwork. And that was the last show.

Berlin, 1990

Bob McDaniel, a 39-year-old lieutenant colonel and a C-141 flight examiner pilot at Charleston Air Force Base in South Carolina, learned in 1990 that Charleston would crew a USO tour to Germany. McDaniel is now the director of St. Louis Downtown Airport.

I was in the right place at the right time. When the USO tour came up, it fell to Charleston to man the mission, and since this was a special USO tour that would be going to Berlin, they had to have a crew that had the Berlin corridor qualification and a Russian visa. It turned out there were only two of us that had those qualifications. So that's how I got on the crew.

We had a double crew, with four pilots, four flight engineers, two loadmasters, and two navigators on board, and we switched off on the various legs.

We were told that this would be [Bob Hope's] last USO tour. We celebrated his 87th birthday on board the aircraft on the flight. Of course [Operation] Desert Shield rolled around and Mr. Hope made one additional trip in December 1990, but it was very low key. It wasn't the multi-location tour that he had done in the past.

At the Berlin Wall, the East German guards were still standing at some of the old guard posts, and Mr. Hope started a conversation back and forth through a couple of holes in the wall. They exchanged hats, and took photos of Mr. Hope wearing an East Berlin guard's hat. It was very impromptu, and you could tell Mr. Hope was really enjoying it. I remember it was probably in the low 80s that day, the sun was shining brightly, and it was warm enough that just walking around you'd

work up a sweat. Mr. Hope had his jacket on, collar turned up—you could tell he was on the chilly side, just like any other old geezer.

Mrs. Hope looked out for him quite a bit; she could tell when he was tiring, and she would take him away and get him the rest he needed. But when it was showtime, he was always 100 percent. ➔

Space Shuttle

It's been a long wait—in some ways, more than 50 years—but in April 2010, the U.S. Air Force is scheduled to launch an Atlas V booster from Cape Canaveral, Florida, carrying the newest U.S. spacecraft, the unmanned X-37, to orbit. The X-37 embodies the Air Force's desire for an operational spaceplane, a wish that dates to the 1950s, the era of the rocket-powered X-15 and X-20. In other ways, though, the X-37 will be picking up where another U.S. spaceplane, NASA's space shuttle, leaves off.

The Air Force hopes its unmanned X-37 (right, in taxi tests in 2007) will take on some of the functions of the shuttle (top: *Atlantis*).

With a wingspan of 15 feet and a length of 27.5 feet, the X-37 *looks* like a tiny space shuttle. It has a blunt (though windowless) nose, and one rocket engine bell instead of the shuttle's three. Two cargo doors open just as the shuttle's do, revealing a four-by-seven-foot bay. Like the shuttle, the X-37 was designed for low Earth orbits—in the latter's case, altitudes of 125 to 575 miles. And the craft will fly like a shuttle, reentering the atmosphere with the orbiter's 40-degree nose-high attitude. Af-



TOP: NASA; LEFT: USAF

In this little spaceplane, there's a touch of *Atlantis*.

**And *Discovery* and *Endeavour*.
by Michael Klesius**



TONY LANDIS/NASA DRYDEN; BELOW: USAF

A CH-47 Chinook hoists the X-40A, the X-37's forerunner, for a 2001 drop test at Edwards Air Force Base.

ter reentry, it will change to a 20-degree nose-down glide and, flying at up to 220 mph, land at Vandenberg Air Force Base in California, with Ed-

wards Air Force Base as an alternate.

But as for the period between launch and landing, no one, save for a select few in the Department of Defense, knows exactly what the little Boeing-built spaceplane will do, or for how long. The Air Force Rapid Capabilities Office, which is running the program, says only that the orbital test version, the X-37B, will take a suite of next-generation technologies to orbit and will break new ground in the realm of launch, recovery, and reuse, all with an unmanned twist that the shuttle never offered.

At a 2008 Space Foundation breakfast in Washington, D.C., Gary Payton, deputy under secretary of the Air Force for space programs, recalled the X-37's origins. Payton started the program while at NASA. "Then, the X-37 was intended to be a testbed for new technologies that could retrofit into the shuttle: predominantly guidance, navigation, and control, and [thermal protection system] technologies," he said. In that era, planners imagined the shuttle carrying the X-37 to space in its cargo bay and releasing it.

Now, with the shuttle's retirement looming, it appears the X-37 will have an independent, post-shuttle life. Payton envisioned such a role for the X-37, saying: "It would be really advantageous in my mind if we had a system you could launch, recover, change out the payload bay quickly, and put into a different orbit, and do all that measured in weeks instead of decades." David Hamilton, director of the Rapid Capabilities Office, says in an e-mail: "Eventually, I see the unique possibility to operate X-37B more like an aircraft and explore the needs of responsive, reusable spacecraft." Unlike a satellite, he points out, the spaceplane returns, enabling "detailed inspection and significantly better learning than can be achieved with [a satellite's] remote telemetry alone.

Experiments can be modified and reflown, with the objective of shortening the technology maturation timeline."

"The space shuttle was designed to be a very heavy payload lifter, and it has performed that job extremely well," says Mark Lewis, a University of Maryland hypersonics expert who recently completed a four-year appointment as chief scientist for the Air Force. "But you don't need to send a Mack truck into space when a Toyota Celica will do."

The question is: Will do what? Lewis, whose enthusiastic speech barely keeps pace with his mind, is happy to talk about the skin-deep similarities between the shuttle and the X-37. ("A lot of the basic reentry physics is treated the same way," he says. "Blunt configurations. The shuttle has very blunt leading edges.") But when he's asked about anything more than the X-37's aerodynamics, he clams up.

So does everyone else. "While some aspects of the...program have been designated as unclassified and been released



to the public; information regarding specific technical and performance capabilities will not be released at this time,” writes David Hamilton. “Hide it in plain view,” says one observer of the Air Force’s practice of letting out just a little about the X-37, enough to make it seem like it will never be more than a research tool.

Hamilton does say that “once declared operational, the X-37B could have applications to support missions such as space situational awareness; intelligence, surveillance, and reconnaissance; on-orbit servicing and repair; and satellite deployment and/or retrieval.”

It’s possible the spaceplane could have a role in national security, particularly since China, India, Japan, and even Iran have begun to exploit space. In December 2007, photographs of an unmanned, classified Chinese spaceplane, the Shenlong, or “Divine Dragon,” began to appear on Chinese Web sites. Though hitched to the underside of a bomber, rather than perched atop an expendable booster, the mysterious Shenlong has a blunt nose and single rocket engine bell, making its appearance strikingly similar to the X-37’s.

The U.S. program started out relatively open to view, a research effort jointly shaped by the Air Force, NASA, the Defense Advanced Research Projects Agency, and Boeing. The Air Force ordered the first prototype, the X-40A, from Boeing in 1996. When it came time to produce the next iteration, the X-37A drop-test vehicle, NASA had the company increase the size by about 20 percent.

But since then, the X-37 has taken a winding and perplexing path among NASA, DARPA, and the Air Force. From 2004 to 2006, DARPA oversaw it. Along the way, both the X-40A and the X-37A have been drop-tested (first over New Mexico in 1998 and California in 2006, respectively), which proved their automated approach and landing abilities. Finally the program was taken over by the Air Force. Today, call up any of these organizations and say “X-37” and it’s like spraying a garden hose at housecats.

“I tried to get to the bottom of this program three or four years ago and could not,” says John Pike, the director of

www.globalsecurity.org. “All this ‘orbital spaceplane’ stuff, ‘space maneuver vehicle,’ ‘orbital test vehicle,’ ‘X-37,’ ‘X-40,’ et cetera—six different names for one

and a half real programs.”

The press-shy Rapid Capabilities Office, established in 2003, is charged with getting special combat support and weapon systems developed and fielded as fast as possible. The office answers directly to the Air Force Chief of Staff, the Secretary of the Air Force, and two high-level procurement officials. Given that short chain of command, it’s not unreasonable to imagine that the X-37 could carry classified military payloads like those deployed in 11 shuttle flights made between 1982 and 1992.

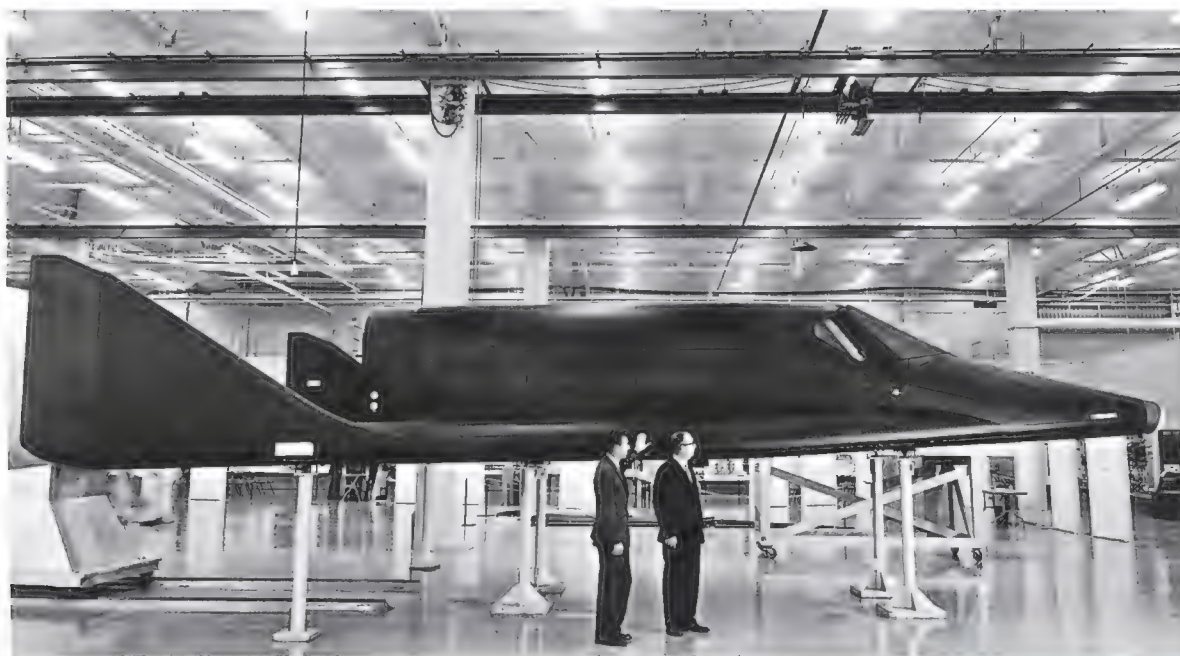
We know more about the X-37 itself than about its possible payloads. “Its resemblance to the shuttle is pretty straightforward,” says Mark Lewis. Like its shuttle forebear, it has a “cold structure” design: It is made of metals that would melt at reentry and thus need to be shrouded. But while the shuttle’s structure is made of conventional aluminum, the X-37’s uses lighter composite materials, explained Secretary of the Air Force public affairs officer David Small last March, and

A Boeing technician adjusts panels on the X-37A drop-test vehicle, which made its first free flight in April 2006.



USAF

Opposite: The X-37B orbital test vehicle in Boeing’s Huntington Beach, California plant last August. The adaptor at its base will link it to an Atlas V booster.



The Air Force's first spaceplane design, the X-20 Dyna-Soar, stalled out at mockup stage in 1963.

“advanced, higher-temperature, more durable thermal protection materials are used to protect the structure during reentry.”

Those materials include silica tiles impregnated with the latest version of Toughened Uni-Piece Fibrous Insulation (TUFIs), some of which have flown on the shuttle since the 1994 mission STS-59. The tiles will provide most of the thermal protection for the X-37's underside, and are more durable than earlier shuttle tiles, which have been pocked by debris as light as paint chips. In a TUFIs tile, the surface material permeates the underlying insulation, which supports and reinforces the outer surface and renders it more resistant to impacts. In contrast to the shuttle's older, more rigid glass-fiber composite tiles, TUFIs tiles have a porous nature that stops cracks from spreading.

The X-37 will also demonstrate a new-generation Conformal Reusable Insulation blanket technology, which provides better protection for top surfaces, along with a hard, smooth finish that produces less drag than the shuttle's 1970s-era thermal blankets.

The X-37's most notable thermal advance is on the wing leading edge. On the shuttle, that vulnerable area was covered with reinforced carbon-carbon; the X-37 uses a different material, called TUFROC, for Toughened Uni-piece Fibrous Reinforced Oxidation-Resistant Composite. TUFROC (pronounced “tough rock”) was developed at NASA's Ames Research Center in California by a group led by David Stewart, who has worked on thermal protection systems since the shuttle program.

Stewart explains that during reentry, heat is generated not just by friction of the vehicle against the atmosphere, but also by atoms on the surface recombining. In the shuttle's case, the carbon-carbon oxidizes. As the name implies, the new material resists oxidative damage. The surface of the shuttle's tiles heats up very fast because the insulator's high-density coating is very thin. TUFROC's surface material is thicker, and therefore takes longer to heat up. And the new material will reduce weight, which will enable the spaceplane to carry more payload.

The X-37 embodies other modifications of shuttle technology. All shuttle-era hydraulics have been eliminated; the

new spaceplane's flight controls will be operated electromechanically, making the X-37 fly-by-wire. Unlike the shuttle, with its one vertical stabilizer, the X-37 has two short diagonal ones, called ruddervators—surfaces that combine the functions of rudders and elevators. These reduce the amount of propellant needed to handle trim and control during the high-speed, high-angle-of-attack



reentry, and provide room for a centerline speed brake that manages the vehicle's glide energy just before landing.

Upon reaching orbit, the craft will deploy a solar array that will power batteries. Those batteries have replaced hydrogen fuel cells, the shuttle's power source in orbit. The vehicle will maneuver in space powered by a combination of nitrogen tetroxide and hydrazine. Theoretically, the X-37 could rendezvous with other satellites of interest to the Air Force, friendly or otherwise.

If the X-37 is to carry out such national security missions, its roots will extend back beyond the space shuttle, to ear-

Field of dreams: X-planes, June 2000, Dryden center, California. Left to right: The X-37A, X-40A, and X-34, cancelled in 2001, surround a little mockup of the hypersonic X-43. Right: Scaled Composite's *White Knight* launched the X-37A on three glide tests in 2006.

lier spaceplanes. Says Mark Lewis: “I would draw a heritage not only to the shuttle, but to my very favorite program that never was: the X-20.”

A follow-on to the X-15 rocketplane, which didn’t have the power to get to orbit, the X-20 Dyna-Soar spaceplane, initiated in 1957, would have ridden a massive Titan III booster all the way to orbit if needed, and carried a pilot. (Neil Armstrong was one NASA test pilot selected to fly it, but in 1962 he transferred to the Apollo program.) Dyna-Soar would have given the Air Force a manned system that could have

spaceplane puzzled Secretary of Defense Robert McNamara; he directed the Air Force to study whether concepts such as NASA’s Gemini could handle some of the roles better. In December 1963, shortly after prime contractor Boeing started building the vehicle and after about \$660 million had been spent, McNamara killed the X-20.

Still, Lewis admires the X-20 from an engineering standpoint: “When we look at Dyna-Soar, we say: Gosh, that’s the program we should have had. Imagine if we had a cheaper way to get to the International Space Station.”

Unlike Dyna-Soar, the X-37 will always be unmanned. Without humans who would limit the amount of time it could orbit, the little spaceplane might be able to stay aloft for as long as nine months. Operationally, the X-37 could become a space version of a long-endurance unmanned aerial vehicle—the world’s first space UAV.

Even with no astronauts, however, safety will be a big issue—in this case, for the payload. After the 2003 disintegration of the shuttle *Columbia*, mission planners developed concepts that would protect the X-37 from a similar fate: damage from insulation coming loose during launch. One idea had the spaceplane perched vertically atop a booster, an odd configuration that resembled an aerospace awards trophy. Still, the spaceplane would ride safely above any insulation that broke off.

But the aerodynamics posed a problem. “People learned thousands of years ago that you don’t fly arrows with the feathers first,” says John Muratore, NASA’s former chief engineer for the canceled X-38, an emergency return vehicle for ISS crews. “Feathers in the tail are stabilizing and feathers in the front are destabilizing,” he says, referring to the wings of an exposed spaceplane perched vertically atop a tall, cylindrical booster.

So the Air Force covered the new little spaceplane with a launch shroud. For now, two big problems have been solved: The rocket should fly right, and when they roll it out to the launch pad, no one will see that the X-37 is inside. Hidden. In plain view. ➤



OPPOSITE: NATIONAL MUSEUM OF THE UNITED STATES AIR FORCE; LEFT: TONY LANDIS/NASA DRYDEN

filled a variety of needs: research, reconnaissance, or even attack. It was designed to reach any target in the world in 45 minutes, deliver a weapon, and glide to a friendly base. Its altitude and hypersonic speed would have made it very difficult to intercept.

While this type of capability sounded like something the Air Force needed, the service had difficulty justifying it. NASA was making progress with blunt-body capsules that reentered the atmosphere without the need for pilot control, and intercontinental ballistic missiles were dominating the nuclear delivery mission. A controlled-reentry



ALAN RADECKI/MOHAVEWEST MEDIA WORKS



THE BIG

A CENTURY AGO, LOS ANGELES LIFTED THE



RACE

RACE TRACK TO THE SKY.

WHEN GLENN CURTISS EDGED Frenchman Louis Blériot at the world's first air race, in Reims, France, in August 1909, few Americans had seen an airplane, let alone an air race. Curtiss won them the opportunity. By bringing home air racing's first important award—the Gordon Bennett Trophy—Curtiss also won the right for his country to host the next international air meet. And thus America got its first air race, held in the city of Los Angeles 100 years ago.

In October 1909, airship pilot Roy Knabenshue, from Toledo, Ohio, and Charles Willard, the first man Curtiss taught to fly, met and decided to use southern California as a winter base for their aerial demonstrations. They contacted Curtiss, thinking his fame would help draw crowds as big as those that attended the event in Reims. Curtiss agreed to the plan, though he had no intention of using the venue to defend the trophy; that race would be months away and held in New York, where

of 1910

BY DON BERLINER

he believed more money was to be made than in California. Knabenshue contacted Los Angeles promoter Dick Ferris, who in turn, got the Los Angeles Merchants and Manufacturers Association on board for financial support, and persuaded railroad magnate Henry Huntington to pledge \$50,000. (For Huntington it was a no-brainer; his trains, after all, would haul spectators to the meet.)

"No one knew who would come," says Judson Grenier, a history professor retired from California State University at Dominguez Hills. "But there was a great economic optimism, with the city bringing in water [by funding a \$23 million aqueduct] and getting a port [by annexing nearby San Pedro], both in August 1909. So the feeling was: If we can do that, we can do anything."

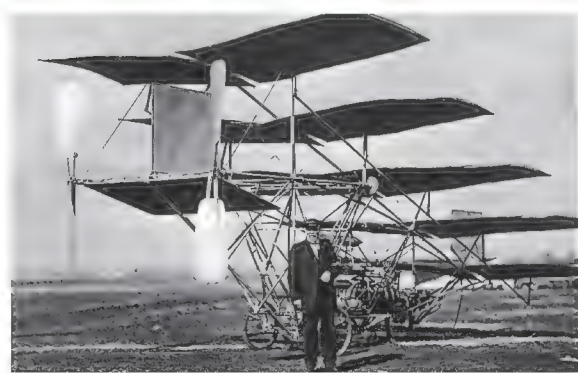
One of the first to see economic opportunity in air racing was newspaper owner William Randolph Hearst, who

And the crowd goes wild: Glenn Curtiss soars in his biplane over Dominguez Field near Los Angeles, putting aviation's indelible stamp on southern California. Inset: a souvenir from the race.





The races—along with demonstrations—took place at Dominguez Field, just south of Los Angeles, on land loaned by the family of Manuel Dominguez, from January 10 to 20. Workers had erected a grandstand capable of seating 26,000, and pitched large tents for the pilots to store and work on their airplanes. The advertised prize money was \$70,000. Much of it was for specific tasks, such as \$10,000 for a nonstop balloon flight to the Atlantic coast, which went unawarded. More realistic were the prizes for breaking major world records, although many of those too were never claimed. But all helped achieve the goal of bringing together some of the most skilled and daring pilots in the United States.



flogged the event in his *Los Angeles Examiner*, one of the city's four daily newspapers. Hearst, who had traveled down from San Francisco, arranged for a hot-air balloon to be tethered on the grounds during the meet. On the balloon's side were the words "It's all in the *Examiner*." And it was, including fashion tips for women spectators.

Skilled and daring pilots were not plentiful in 1910 America. Although 43 flying machines were officially entered, only 16 showed up, and not all of them flew. One five-wing "multi-plane" built by a local high school teacher, for example, participated only as a static display; it couldn't get off the ground.

Despite the nearly empty skies, the meet caused a sensation in Los Angeles. Fans clambered aboard Huntington's streetcars, which left the city for the field every two minutes. More than 20,000 packed the stands each day. To draw out-

Curtiss first won fame in Reims, France (top), in August 1909, where a Blériot monoplane rounds a pylon and an enterprising photographer. In 1910, Los Angeles drew all sorts of contraptions, including J.S. Zerbe's five-winged failure (above). Below: Pilots Charles Willard, Charles Hamilton, and Curtiss (left to right) all won cash prizes.



TOP: SI-95-2260-A; MIDDLE: COURTESY OF JOHN GARRETT COLLECTION; BOTTOM: NASM-9A03620-A

of-towners, the meet's executive committee, of which Ferris was a member, had cleverly arranged for each day to honor a different city: "San Diego Day," "San Francisco Day," and so on. Schools in the honored districts were closed on those days, so when it was Los Angeles' turn, a 13-year-old named Jimmy Doolittle (who himself became a famous race pilot, before gaining even more fame for leading a World War II bombing raid on Tokyo) got to see his first airplane.

"The city was turned on," says Grenier. "I don't think any other event has had that kind of effect of shutting down the city for two weeks. You had businesses closing, schools letting out, women's groups coming in en masse. Anybody who could walk, and some who couldn't, made it to the meet. Cars were pretty primitive then, with canvas tops, so only a very small number of people came in cars. Most of them rode the train, then walked the half-mile to the field. It was kind of the climax of boosterism that's so characteristic of Los Angeles."

The star of the show was a charismatic Frenchman, Louis Paulhan, who had brought two Farman biplanes and two Blériot monoplanes and was guaranteed \$25,000 to appear. Described in newspapers as "the wonderful little Frenchman,"

he had worked in a military balloon factory and taught himself to fly airplanes. Paulhan's appearance qualified the meet as "international," and he set new world records for endurance and altitude. He took to the air at the slightest encouragement, often appearing to plan his flight as he went along. Paulhan's 45-mile round trip between the field and the Santa Anita racetrack brought thousands of people

Though Curtiss and his Reims racer were celebrities (below), Louis Paulhan (bottom, front, with a passenger in his Farman) was the crowd favorite. Right: A meet poster.



TOP & MIDDLE: COURTESY OF JOHN GARRETT COLLECTION; BOTTOM: NASM-9A03624-A

to rooftops and farm fields in hopes of seeing the fearless aviator.

Curtiss, who was the first in the air over Dominguez Field in his Reims racer, was not bothered by all the applause for Paulhan, according to C.R. Rosenberry's book *Glenn Curtiss: Pioneer of Flight*. "I am satisfied to let Paulhan have the applause, providing I am able to take the prizes," he was quoted as telling a colleague.

Curtiss may have feigned indifference, but he was under enormous pressure at the time, says Ken Pauley, a retired aerospace engineer in San Pedro who has produced a photo book about the meet in conjunction with the centennial. "He was due in court in New York the next month to answer the Wright brothers' lawsuit [over patent infringement]. The Wrights had clamped down lawsuits against both Curtiss and Paulhan." Curtiss, in fact, used the meet to try to gather witnesses to bolster his

defense. He "seized every opportunity, when the field was free from program events, for demonstrations calculated to disprove the claim of the Wrights that the control of his machines, like theirs, depended on a combination of the rear vertical rudder with the action of the ailerons," Rosenberry wrote.

Although the Wrights did not accept an invitation to attend the meet, they were kept well informed about it. Before it was over, Wilbur Wright had cabled Roy Knabenshue, asking him to come to Dayton, Ohio, to discuss managing a flying team (see "Ladies and Gentlemen, The Aeroplane!," Apr./May 2008); by mid-March, Knabenshue was on the payroll.

"The meet really had a tremendous impact on how people thought about transportation," says Pauley, who worked on the Apollo heat shield for North American Rockwell. "Aviation was something

new for them and no longer a joke or a fantasy. I remember my grandfather's skepticism about going to the moon. It was the same thing here with the airplane."

Air racing today generally involves similar airplanes forming up and tearing wingtip to wingtip around pylons. In 1910, such behavior was simply unheard of. The most popular challenge then was to set the fastest time for a single lap around a six-pylon, 1.6-mile course. Four pilots, flying one at a time, made at least one attempt at that at Dominguez Field, with Curtiss making five separate laps on four days. His fastest speed was 43.9 mph, nearly as fast as his winning speed at Reims, where the course was much longer and thus enabled higher speeds (Curtiss had won the Gordon Bennett Trophy with a speed of 46.5 mph). His nearest rival was Paulhan, almost nine seconds slower. The only other airplane race to attract more than one pilot was a 10-lap circuit, which Curtiss also won over Paulhan.

Curtiss again was crowned the "king of speed" after a wind-aided dash in front of the crowd at an estimated 60 mph. But his was a solo run. What brought the crowd to its feet was a head-to-head dirigible race around the oval by Knabenshue and Lincoln Beachey. It was the most exciting air race yet seen—even though both were chugging along at less than 20 mph. Beachey, who won by a few seconds, sensed the end of the airship era at Dominguez Field and "wondered how long his dirigible career would last," wrote Frank Marero in *Lincoln Beachey: The Man Who Owned the Sky*. Beachey went on to become one of America's greatest acrobatic airplane



With Lincoln Beachey at the controls (above), a Curtiss design dashes past the crowd, but not fast enough to earn points from the judges (right). Below: A Blériot, the first monoplane to fly in America. Inset: A souvenir medal.



TOP, OPPOSITE & INSET: COURTESY OF JOHN GARRETT COLLECTION; BOTTOM: NASM-9A03618-A

The year's final big air meet, in New York, brought out high-altitude specialist Hubert Latham, shown getting into the cockpit of his Antoinette monoplane.

pilots and the first to fly a loop.

A wealthy Seattle timber man named William Boeing was so impressed that he asked nearly every pilot to take him up for a ride. Only Paulhan agreed. The 28-year-old Boeing waited three days, but discovered on the fourth that the Frenchman had left the meet. (Four years later, a friend gave Boeing his first ride, in a Curtiss hydroplane that he found noisy, unstable, and terribly uncomfortable. He decided he could build a better airplane.)

Though Paulhan was slower than Curtiss, he won more in prize money—\$19,000 to Curtiss' \$6,000. More than 200,000 people had turned out over the 11 days, and gate receipts were \$137,520, against expenses of \$115,000. (The Gordon Bennett Trophy race wouldn't be held until the year's last big air meet, at Belmont Park, Long Island, New York, from October 22 to 31; cold winds kept all but a few thousand people from attending.)



Today, there's little left of what the *Los Angeles Times* in 1910 called "one of the greatest public events in the history of the West." Where the hilltop grandstand once stood is now a five-million-square-foot warehouse complex called the Dominguez Technology Center. Tenants include aerospace firms TRW and Northrop Grumman, and streets around the center are named after the pilots who flew in the meet. The nearby Dominguez Rancho Adobe Museum is planning displays, lectures, and other ac-

tivities throughout 2010 to mark the race centennial.

The biggest legacy may be the continuing presence in southern California of the aerospace industry—the state's biggest employer. From Lockheed Martin's Skunk Works in Los Angeles to Boeing's sprawling space system offices in Huntington Beach (named for L.A.'s railroad king), the leading aerospace companies help prime the nation's economic pump near the city that welcomed America's first air race. ✈

Roy Knabenshue, who was instrumental in getting the meet to Los Angeles, maneuvers his airship above the field. His dirigible race with Beachey had the crowd on its feet. Site of the last major air race of 1910: Belmont Park, Long Island (right: ticket).



TOP: SI-80-12307-B-A; MIDDLE: NASM-9A00716-A; BOTTOM: COURTESY OF JOHN GARRETT COLLECTION

The Do-Everything Bomber | Douglas Model 1211-J

BY JOHN ALDAZ AND SIR GEORGE COX

ON JANUARY 26, 1950, when General Curtis E. LeMay, commander of the U.S. Air Force Strategic Air Command, attended yet another conference to discuss the next U.S. long-range heavy bomber, his mind was likely already made up. The Convair B-36 was soon to be obsolete, and a variety of successors had been proposed. But Boeing bombers had served the U.S. military well during World War II, and if LeMay got his way—and he usually did—the next big bomber would be another Boeing product: the B-52 Stratofortress.

The potential contract was huge, and U.S. aircraft manufacturers brought ambitious proposals to the table. One of the designs—the Model 1211-J—came from the Douglas Aircraft Company in Santa Monica, California. Never had a bomber

looked so capable—on paper.

Powered by four turboprop engines, the Model 1211-J was a colossus—160 feet long with a wingspan of 227 feet, about the size of the Convair behemoth it was to replace. It was designed around a new 43,000-pound conventional bomb but could carry nuclear weapons as well. It could also carry its own fighter escorts, as parasites under its immense wings. A variety of fighter types were suggested, in-

cluding Douglas' new ogival-wing jet, the F4D Skyray. The fighters' jet engines were to be powered up to assist the carrier bomber during takeoff; refueling of the fighters was to take place while they were stowed on the mothership's underwing pylons.

Though the concept of parasite aircraft had an appealing ingenuity, flying them was fraught with difficulty. Flight testing had revealed that turbulent airflow would

The Douglas Model 1211-J was a grand scheme that existed only as a model and in blueprints (right, top and bottom).

Below: In addition to hauling its own fighter escorts, the bomber could be equipped with pods of every description.




JOHN ALDAZ (2)

Without the parasites, the Douglas bomber could defend itself with a choice of radar-controlled 20-mm cannon or Hughes MX-904 self-guided missiles, stored in an internal rotary launcher like an over-

[illegible]

LEFT: NATIONAL ARCHIVES VIA JARED ZICHEK; RIGHT: JOHN ALDAZ

By including so many options, the Model 1211-J's designers tried to make the bomber a paragon of multi-tasking self-sufficiency. They had hoped to sell the Air Force not just a single bomber but a family of aircraft, with a variety of airframes to choose from, including custom options and mission-specific add-ons. But would asking so much of the 1211-J compromise its ability to do its main job: put bombs on target? "I've always been a minimalist in aircraft design," says aerospace historian and author Dick Hallion. "When you take a look at this Douglas design, there's a lot of frou-frou. There are a lot of things here that wouldn't

The Douglas designers of course hoped to dazzle the Air Force with possibility, but no matter how much versatility they put into the 1211-J, it wasn't enough to interest LeMay, who kept pushing for the more practical, turbojet-powered B-52. In the spring of 1951, Air Force chief of staff General Hoyt Vandenberg approved the Boeing proposal. Given the stupendous—and ongoing—career of the B-52, this was certainly a wise decision. 



LEGENDS OF VIETNAM

LOOKING FOR MACH-BUSTING SPLENDOR in million-dollar wonders from the heavies of the U.S. military-industrial complex? This ain't it. The A-37 Dragonfly was a waist-high, subsonic light attack aircraft that could lift its own weight in fuel and armaments, built by a manufacturer known for civilian pleasure craft. You could get a half-dozen for the price of a single F-4. The A-37 brought jet-propelled combat in Vietnam down from rarefied heights to the low-and-slow—where the acrid haze of rice-burning season permeated the unpressurized cockpit and you plucked bullets from Viet Cong small arms out of the armor plate under your seat after a mission. Its claim to fame?

"I've checked around and there really isn't anyone here who can help you," wrote a spokesperson at Cessna-Textron Inc. after I requested background on the only jet fighter the company ever made. Even books on the air war in Vietnam give it only passing reference, and one official Air Force account leaves it out altogether. I know some guys who are saying "We told you so" right now.

I was with them in a Branson, Missouri hotel for the A-37 Association reunion in May. "Forget it," Robert Macaluso answered, when I asked about Dragonfly mystique. "If the airplane isn't fast and doesn't wow all the girls, then the airplane doesn't count. We didn't have clout. We never got credit." If "credit" means "promotions," he's right: A-37 pilots do not lead the league. The career arc of its pilots hit a glass ceiling that kept many from top ranks. Macaluso, a Distinguished Flying Cross recipient who went on to a career as a Continental Airlines captain, voices a recurrent theme among A-37 alumni: While Vietnam's "Heavy Metal"—the McDonnell F-4, North American

F-100, and Republic F-105—deservedly got glory, the A-37 couldn't catch a break.

This wasn't your flying club's Cessna. The most recognized name in civil aviation launched its military line in 1949, with an observation aircraft, the O-1 Bird Dog, a high-winger that became famous for drawing enemy fire but not packing much to return it. In 1952, when the Air Force needed a trainer to transition fighter pilots into the Jet Age, Cessna entered a concept it called the Model 318 in the design competition—and won. Designated T-37 by the Air Force, the trainer featured two French-designed Turbomeca J69 engines and side-by-side seating for student and teacher, a show-and-tell environment superior to tandem cockpits. Straight "Hershey bar" wings, forgiving of novice inelegances, plus a wide-track, training-wheels landing gear, eased the segue from propellers. Most students soloed after only six hours. Besides, it just looked user-friendly. Other pilots scaled ladders to mount their exalted steeds. T-37 trainees threw a leg over and eased into the cockpit like they were getting into a top-down Corvette.

It sounded like nothing else, however. The 21,000-rpm turbine blades of the feverish J69s produced a high-pitched squeal, earning the nickname "Tweety Bird," soon shortened to "Tweet." There are ground crew alums walking around today with hearing loss in the upper frequency ranges from that earplug-penetrating shriek. Fated to serve with aircraft called Phantoms and Thunderchiefs, a tag like "Tweet" perhaps marked the beginnings of the airplane's stigma. (It got worse: Some called it Baby Jet; others, the "6,000-Pound Dog Whistle.")

Nevertheless, the T-37 ended up as the Air Force's



When the Air Force needed a light attack aircraft – fast – it turned to Cessna. The company's prototype, the YAT-37D, had proved itself in 1964 tests at Edwards Air Force Base (left). In 1967, four months after delivery, the new A-37A entered combat in South Vietnam (above).

LEFT: NARA; ABOVE: ROGER MOSELEY



SUPER

**THE A-37 DRAGONFLY CARRIED
6,000 POUNDS OF WEAPONS.
BONUS: THEY HIT THE TARGET.**

BY STEPHEN JOINER

TWEET



Combat Dragon mastermind Lou Weber (at right) thanks his crew chief. A-37 maintenance officers earned bragging rights for fast turnarounds between missions.

primary jet trainer for 50 years. It remains the soft-focus, first romance for generations of pilots who advanced to everything from lunar landers to the F-22 Raptor.

By 1966, the escalating war in Vietnam was decimating the Douglas A-1 Skyraider, a World War II-era attack aircraft. Younger jet-trained pilots had difficulty being re-educated for the radial engine taildragger. ("I took two rides and it scared the bejeezus out of me," Bob Macaluso said.) A few years earlier, the Air Force had evaluated a T-37 modification for light attack missions; in 1966, it decided to order the YAT-37D to supplant A-1s. General Electric J85 engines had replaced the Turbomecas, delivering twice the power yet squelching the ear-splitting squeal. Wingtip fuel tanks and ordnance-bearing pylons had been added, plus a 7.62-mm mini-gun in the nose. Staple arms were Mk.80 bombs, cluster tubes, and napalm tanks. Finally, a Cessna could fight back.

The YAT-37D became the prototype for the A-37A. Cessna converted 39 T-37s to A-37As and sent 25 to Vietnam for Operation Combat Dragon, overseen

by Lieutenant Colonel Lou Weber, a red tape-averse veteran of the legendary World War II Flying Tigers. At England Air Force Base in Louisiana, Weber brainstormed a battle plan and assembled the unit that became the 604th Air Commando Squadron, based at Bien Hoa, South Vietnam.

Weber's plan was an Air Force first: To fast-track the A-37 into action, he proposed making live combat part of the aircraft's operational testing. "No other aircraft had ever gone into combat that hadn't been tested previously," said Lon Holtz, a Silver Star recipient who also flew F-4s and F-16s. "Other fighters were proven here in the States—they'd gone through their certification, their weapons loading, their maintenance procedures. That's not the case with the A-37. This aircraft went over to prove itself in combat."

The diminutive A-37s were crated, then transported to Vietnam in Lockheed C-141s. Cessna employees unboxed and assembled each one. This kit-plane, "batteries included" debut didn't boost its cred among pilots of the brawny Super Sabres based at Bien Hoa. "We took a whole bunch of crap from them at the officers' club," Lon Holtz told me in Branson. The fighter got a moniker upgrade from "Tweet" to "Super Tweet." "And they called us Mattel Marauders too," he laughed.

At Nha Trang Air Base, a Dragonfly emerges from its cocoon. Next stop: The 3rd Tactical Fighter Wing at Bien Hoa.



TOP: COURTESY LOU WEBER; LEFT: NARA

Thirty pilots accompanied the airplanes, most having 25 hours or less in the T-37. They came from all types of aircraft, bombers to transports. Weber wanted to make sure that a pilot with any experience could fly the Super Tweet in combat. His theory and implementation were built on a no-frills formula: Make a rudimentary fighter out of a trainer that every pilot was already comfortable with and put it into action fast. No advanced weapons systems to learn—a low-tech, World War II-style bomb delivery. Traditional nine-month training program to get a guy into combat? Not required.

In August 1967, A-37s began providing close air support for two areas in South Vietnam, known as III and IV Corps. The straight-wing configuration enabled lower, 100-mph-slower engagement than swept-wing fighters. This translated to pinpoint bomb accuracy—averaging inside a 45-foot radius—and giddy forward air controllers. (“Thank God,” one blurted over an open mike on one sortie when F-4s were replaced by A-37s; “now I have somebody who can actually hit the damn target.”)

But wouldn’t that tactic also make the aircraft clay pigeons for enemy gunners? “I climbed in the airplane, flew my first combat mission, got shot at, and immediately figured out they couldn’t hit me,” Holtz said. In a dive, a Dragonfly presented a measly target. Enemy gunners were confounded by its atypical speeds and altitudes, said A-37 Association founder Ollie Maier, a captain who flew more than 500 missions. “They were accustomed to leading a certain amount in their aim because the F-4s and F-100s came in high and fast,” Maier said. “We’d come in and see their tracers way out in front. They often tended to over-lead us.”

Low-level missions presented certain hazards, of course. “I was always cleaning out grass and tree limbs from underneath the A-37s,” said Charlie Kraesig, a maintenance officer. “These guys would get target fixation because they were always coming in



so low and concentrating on the target and they just didn’t realize how close to the ground they were.”

Bob Chappellear can verify that observation, especially the part about tree limbs. As an Air Force captain, barreling north in Cambodia, he saw too late a particularly tall tree in his path. “I sheared off the top 15 feet,” he said. The 400 mph impact made his A-37 yaw radically. The entire leading edge of one wing was crushed. Napalm was spraying all over the airplane. “I told myself, if I’m still alive ten seconds from now, I’d better raise the ejection handles and squeeze the triggers,” Chappellear said. “But then I thought, I’m not very far from a bunch of guys I just bombed, so that might not be a smart idea.” The A-37 strained away from highway-dusting height with its left wing bent back 25 degrees and drop tanks dangling. Both GE jet engines faithfully delivered thrust as Chappellear ran a controllability check. “Everything was fine,” he said, still sounding grateful nearly 40 years later. “It was like ‘Fly it home and land it.’ Besides, it was getting dark and I did *not* want to spend the night in that jungle.”

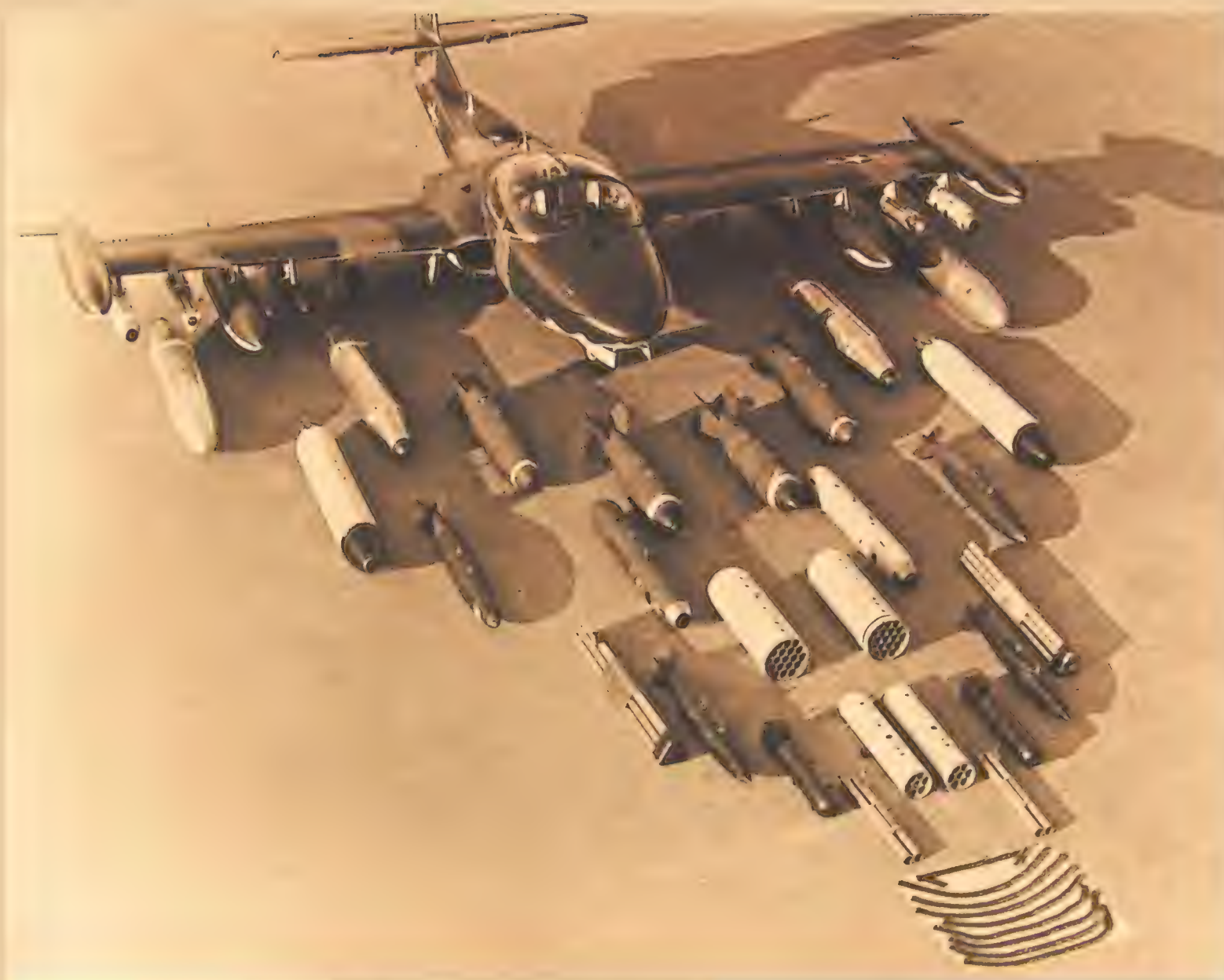
In Vietnam, the air war began when gear left ground—sometimes before. “A lot of times Charlie was sitting right off the end of our own runway shooting at us as we took off,” Maier said. This made pilots grateful for the Dragonfly’s pole-vaulting climbout rate. While a fully loaded F-100 might use every yard of pavement just getting airborne, “we were already leveling off up at 1,000 feet before we even got to the end of the runway,” said Maier. At sprawling Bien Hoa, snipers occasionally infiltrated even the grassy infield. Lloyd Langston, a first-wave Combat Dragon pilot, told me of traversing the long, exposed taxiways with an M-16 rifle across his lap.

It might have been handy aloft too. The nose-mounted mini-gun—“Basically, a BB pistol in com-

Attacking, the A-37A skimmed the treetops. Its pilots came from all backgrounds: Lon Holtz (below) had been a KC-135 navigator.



TOP: NATIONAL MUSEUM OF THE USAF; RIGHT: COURTESY LON HOLTZ



Able to heave 5,880 pounds of ordnance, an A-37 could deliver a blow almost as powerful as an F-100 Super Sabre's. Among its arsenal: Mk.80 bombs, napalm canisters, cluster bomb units, and rocket launchers. Below: An armed Dragonfly leaves its revetment.

bat," Lon Holtz called it—was of limited effectiveness penetrating heavy jungle canopy when strafing. "In 350 missions, I think I used it once," he said.

In its first 3,000 sorties, not one A-37A was downed by enemy fire. Combat Dragon continued until December 1967. After five months and 19,000 ordnance deliveries, the airplane and Weber's operational strategy were vindicated. From studying the 5,000 combination flight tests—combat missions flown during the operation, Cessna developed the bulked-up A-37B, with more thrust from newer-generation J85 engines plus inflight refueling capability.

By nine months in country, the 604th had completed an astounding 10,000 sorties. The numbers reflect the fact that the A-37 could be turned around in as little as 90 minutes. The Cessna had none of the muscle fighter's high-maintenance temperament. "The two-to-one ratio of maintenance to flying hours was fantastic," crew chief Bill McCall explained in

Branson. "An F-101 was something like 12 to 1. Give me two A-37s and I could literally keep them flying day and night."

Cessna's design concept was "walk-around maintenance," with multiple access panels in strategic locations. Switching out a powerplant took less than an hour—though the low-ride A-37 was certainly the only fighter that had to be jacked up to drop an engine. It was so low, in fact, that its engines were especially prone to hoovering up runway crumbs. Quirky, hydraulically actuated foreign-object screens filtered the jet intakes. They retracted at liftoff, but



TOP: NARA; LEFT: ROGER MOSELEY



eral pilots told me that snuffing a perfectly good jet engine at 25,000 feet could be unsettling, but no one recalled ever failing to get a relight.

The second seat, a T-37 carryover, generally went unoccupied. But not always. "I spent a lot of time with VIPs beside me," said Lloyd Langston. After Combat Dragon, deployments to the 604th continued Weber's "Everyman" theme. A-37 pilot Wayne Moorhead declined his first assignment in F-105s to complete a master's degree in industrial studies. "It wasn't like we were career fighter pilots," he said at the reunion. "What's phenomenal is, we were a conglomerate of average pilots from all backgrounds."

The career-minded, however, faced the challenge of using "Super Tweet" and "mini-gun" in the same sentence and still sounding like brigadier general material. Dragonfly experience wasn't the résumé enhancement that Heavy Metal flying was. "You had a big speed bump on your record to get over," Robert Macaluso admitted. "You weren't accepted as a real fighter pilot." There were exceptions: John Blaha rose from A-37s to command space shuttles, and Lieutenant General John Bradley, with half of his 7,000 hours in A-37s, became chief of the Air Force Reserve. Bradley remembers the sting his squadron mates felt in 1971 when *Stars & Stripes* recognized an F-4 unit

could be redeployed as needed. After missions, maintainers would clear the screens of stones, sticks, and a random sample of Vietnamese vegetation.

Another perk peculiar to A-37s was the option of single-engine cruise. At the time, it was the only Air Force jet authorized to shut down an engine in non-emergency conditions. Cruising on one burner conserved fuel for more loiter time above the target. Sev-



A rare five-ship formation flies a 1969 mission over South Vietnam. Above: Robert Macaluso with his camo-painted Super Tweet. The A-37 was his first post-training airplane. After a three-month checkout, he went to Vietnam for his first combat tour.

TOP: COURTESY ROBERT MACALUSO; RIGHT: NARA



Richard Martel earned a Silver Star for a 1967 close air support mission that saved a U.S. special forces unit.

for a “phenomenal” 680 sorties in a month. “We said to each other, ‘Man, we just flew 1,200,’” he said.

One reason the Super Tweet didn’t make headlines—and didn’t suffer heavy casualties—is that it didn’t fly into North Vietnam, where over the course of the war, air defenses claimed almost 200 F-4s and 300 F-105s. It stayed in the

south—and in Laos and Cambodia—where U.S. ground forces were fighting.

When A-37 pilots remember the war, they talk about protecting “the guys on the ground.” Before deployment to Vietnam, Major Richard Martel made one request of the Air Force: “I really don’t want to kill people.” He applied for an unarmed reconnais-

sance aircraft. But Martel was a computer specialist who flew a T-33 trainer weekly just to keep his skills sharp. Another candidate for Lou Weber’s 604th. At the reunion banquet, the staff was stacking chairs and yanking tablecloths from under our drinks when Martel told me about the ironic path from his request to a Silver Star.

On November 29, 1967, he found himself far from his first-choice assignment, piloting one of two heavily armed A-37s circling atop a stack of Super Sabres at midnight. On the ground 16,000 feet below, in a place called Bu Dop, a special forces air base was under siege by Viet Cong hunkered down in thick jungle. The F-100s rolled in, bombing and strafing, then left the area. Despite the pounding, an anxious forward air controller alerted Martel to a multitude of Viet Cong massing for a final assault. Only the two A-37s remained above the target, both carrying 250- and 500-pound bombs plus six tubes of CBUs—anti-personnel cluster bomb units. Martel radioed the

LEFT: COURTESY RICHARD MARTEL; BOTTOM: YUKIHIRO KANEKO



other Dragonfly pilot to extinguish his navigation lights and rotating beacon, then flipped his CBU switches to "HOT."

"We're going down now, lights out," he told the FAC.

"We're gliding down from altitude completely dark with our throttles pulled all the way back to idle," he recalled. "It's pitch black. The VC think everybody's gone home. They can't see us. They can't even hear us. I dove the last 6,000 to the deck and leveled out at 100 feet. But that's nothing in an A-37."

Tracers from Russian-made 12.7-mm guns swarmed him as he methodically dispersed cluster bombs from rock-throwing altitude. He laid them in a swath 300 meters long. Flying a racetrack pattern, his wingman followed, also strewing the bomb units.

The ambivalent combatant, whose one request was duty in a non-lethal aircraft, paused for an instant four decades later. "We killed them all," he continued quietly. "We killed over 200 of them on one run." Both A-37s climbed away, then returned to take out gun emplacements with hard bombs. "The base was saved," Martel said, regaining his all-in-a-day's-work tone. "And we picked up a little medal." His Silver Star recommendation describes "Outstanding bravery...in the face of the heaviest ground fire anyone has ever received in this area of operations."

On the hotel patio, guests craned their necks to watch four attack aircraft ("A-10s," I heard someone

A-37s didn't make the Thunderbirds, but the South Korean Air Force demonstration team performed in them until 2007 (opposite) .

grumble) execute a flyover in honor of Lou Weber and the A-37 vets. The \$400,000 Dragonfly gave up its role to the \$8 million (in 1980 dollars) Warthog. Dragonflies went to Air National Guard units as OA-37 observation craft. Today, many perform counterinsur-

gency and drug interdiction for Latin American nations, and until recently, some served in South Korea.

Cessna's A-37 never got the girl or the movie deal, but from 1967 to 1974, the Air Force reports, the airplane flew 68,471 missions. Pilots whose squadrons flew 1,000 missions a month consider the figure low.

The work ethic of America's most unhyped combat jet often extended right up to a pilot's final sortie. In a noisy hotel hospitality suite in Branson, Bob Chappelle described his last day in Vietnam. He had flown 475 missions, so I expected tales of fighter pilot-esque revelry—the cork-popping champagne send-off. Instead, just hours from boarding a Boeing 707 that would get him "back in the world," he opted for an all-nighter racking up numbers 476 to 478. Two scrambles after midnight and a shake-and-bake dropping Snake Eye bombs and napalm at daybreak. Then, he landed the A-37 and walked away.

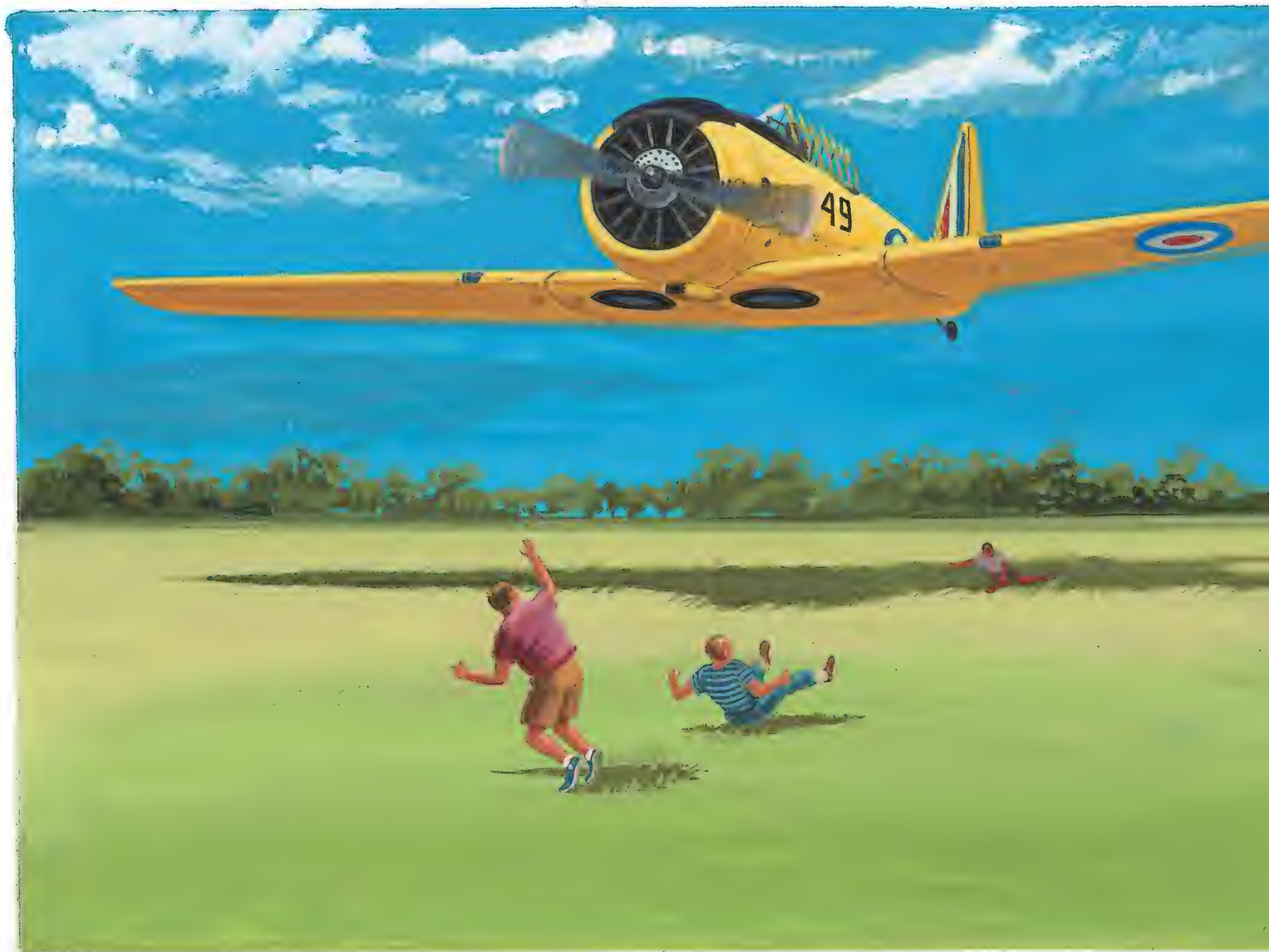
"I just grabbed a quick shower, put on my uniform, and packed my bags," Chappelle said. "Caught the Freedom Bird and came on home." —



In Vietnam, Dragonflies almost always flew in pairs and, with unpressurized cockpits, at a practical ceiling of 25,000 feet.



Following the path of the A-37, the Fairchild A-10 Warthog has been a more capable, if pricier, successor.



IT WAS IMPOSSIBLE to greet the epochal advent of the jet fighter with anything but contempt. I happened to grow up between 1939 and 1945 in a small Canadian town, but any kid born and raised anywhere during World War II knows in his bones that a true warplane wears matte paint the color of mud and swamp water; has exhaust stacks, glycol tanks, air scoops, and a cage-like cockpit; and is pulled ahead by a huge rotating disk. On startup, it snorts awake and coughs and sputters and shoots fire and smoke from its exhaust pipes; the noise smooths into a rising roar on take-off as the landing gear swings up and it barely clears the tree line. When it comes home to land, its wings wigwag a bit and the tail sinks and the airplane bounces a couple of times on its fat black tires before rolling to a quick halt, emitting one

final snort as the prop ticks to a stop.

Where was the romance in a shiny silver pipe that sounded like a vacuum cleaner and flew so fast and so high you could barely even see it? Even today, it's painful for worshippers of warplanes to admit that jets rule the skies and have for half a century.

I doubt I'm the only ex-kid thus frozen in aeronautical time. To have lived through World War II as a boy is to have absorbed a passion for the warplanes hurtling across the skies of Europe and the South Pacific with murderous intent. Their pilots were knights-errant maneuvering for the kill on adrenaline and instinct, furnishing the only glint of glamour in that endless slog of a war. Putting a knight-errant into a jet was like tucking him behind the wheel of a Buick Roadmaster.

A large part of our fascination was that every one of those countless, pre-1945 piston-powered warplane types was so vivid a personality—no two alike. Douglas, Lockheed, Supermarine, Hawker: Each manufacturer stamped its identity on the product—in the shape of the wing and the stabilizer fin, the blunt nose (air-cooled radial engine) or the pointy one (water-cooled in-line), the cross-section of the fuselage. British and American warplanes won our allegiance, in part because kids like me could have been in charge of naming them: Mustang, Spitfire, Hurricane, Thunderbolt, Tomahawk, Flying Fortress, Lightning, Liberator. German kids had to make do with letters and numbers (served them right!): Bf 109 and FW 190. Sinister-sounding Zero aside, Japan's fighting planes were saddled with sissy American-coined



Ode *on a* Canadian Warbird

GROWING UP WITH THE GREATEST AIRPLANES THAT EVER FLEW.

STORY AND ILLUSTRATIONS BY BRUCE MCCALL

In the soft light of memory: Canadian lads, eager for a brush with World War II glory, would attempt to stand up to low passes by AT-6 Harvards.

nicknames like Betty and Dot.

The media of the day didn't cater to kids; we had to feed our avidity for warplane facts by scrounging information via bubblegum cards, the silhouettes in plane spotter books, magazine photos, movies, and comic strips like *Terry and the Pirates*, *Steve Canyon*, and *Buz Sawyer*. Peer status hung on micro-knowledge: the difference, for example, between a Blackburn Skua (a fighter/dive bomber used by the British Fleet Air Arm) and a Blackburn Roc (an improvement on the Skua with an electrically driven, rotating gun turret).

What a mercy that kids couldn't penetrate the hectic Allied propaganda enough to learn, for example, that the Brewster Buffalo was a big fat hog of a fighter and a sitting duck in combat; that its pilots

called the Bell Airacobra the Iron Dog (and not as a compliment); that the majestic-sounding British Boulton-Paul Defiant, its only armament a fixed, forward-firing gun turret amidships, was a kind of airborne Maginot Line; that at least half of all British bombers circa 1942 belonged in military aviation's old-age home even before the war. In a kid's superheated patriotism, anything with wings and a British roundel or American star—or a red Russian star, don't let's forget our Gallant Soviet Ally—was a gladiatorial hero.

The kid bursting with warplane mania needed outlets, so as not to explode. Drawing warplanes was easy, cheap, quick, and satisfying, and turned my bedroom walls into a gallery of aviation art refreshed almost daily. Flying models promised to be even more fun. Building them proved, alas, forever just beyond the skill and patience of a nine-year-old; every attempt to cut and glue all those delicate balsa wood ovals and stringers into something resembling a Spitfire or a Messerschmitt exploded in curses and tears long before the glorious realm of rubber-band-powered flight was ever attained. Carving a 25-cent solid model from a rock-hard

block of basswood with a paring knife (X-Actos were for the gentry) ended in similar frustration; the result would never even approximate the sleek object on the cover of the box.

To the despair of Canadian lads, some evil pact between FDR and Ottawa blocked the inflow of far superior American-made toys; I can never forget that visiting kid from Detroit smugly flashing a beautiful little plastic B-17 in his palm like the Hope diamond. The tiny Canadian toy industry's conversion to a wartime market produced only a crude metal object, painted an idiotically inauthentic pastel blue or mint green or scarlet, that looked like a Hawker Hurricane only if you held it at arm's length and squinted.

Canada, so vast and empty and safely distant from the European war, was the natural venue for a sweeping emergency program called the British Commonwealth Air Training Scheme. Almost as soon as war had been declared against Germany (Canada beating even Britain to the punch), training airbases sprang up across the country to mold fighter pilots and combat aircrews out of raw British Commonwealth and various other Allied

recruits. Three or four such bases lay within a 20-mile radius of my Ontario hometown, the closest a mere nine miles east, near the hamlet of Jarvis. To a war-wild kid of eight, this was better than if they'd plunked down the Great Pyramid of Cheops in those empty fields.

My fondest dream was to get as close as possible to the action of the war—fated, barring some miracle, to remain a dream for a kid stranded thousands of miles from the battlefield. But miracles can happen. One such occurred the day in 1942 when my expat Uncle Gib, a New Jersey doctor and a lieutenant in the U.S. Army Air Forces, stopped by on a family visit. “Kindly Uncle Gib,” I should have said, because he leveraged his prestige to wangle the five McCall boys a tour of the Jarvis Bombing and Gunnery School.

What shimmers brightest in memory from that enchanted afternoon 60-odd years ago was the quiet ecstasy of walking along the tarmac and touching real warplanes with my own hands. I discovered that real warplanes were streaked with oil and exhaust burns, scratched and patched in ways that escaped notice in those glamorous aerial views. Only superannuated types flew at the Jarvis school, like the Fairey Battle, an ungainly fight-

er-bomber that had almost singlehandedly lost the Allied air war over France in 1940; the Bristol Fairchild Bolingbroke, a variant of the Blenheim light bomber; the Westland Lysander, a gawky high-wing observation plane; and the Avro Anson, a harmless-looking twin-engine bombing trainer. All of the Jarvis aircraft were painted bright yellow like all RCAF training aircraft. But in the eyes of the boy airplane nut, every one was vital in the Allied war effort.

The thrills weren't always static. Our tiny corps of fanatics soon sniffed out the fields near town where student fighter pilots practiced low-level runs. The “Danger: Low Flying Area” signs served only as an invitation to stand out there in the open until an AT-6—Harvard, in RCAF nomenclature—suddenly materialized on the horizon and thundered straight toward us 30 feet off the ground, flattening even the nerviest against the earth as it passed overhead in a mad blur of noise and propwash. Whereupon you got up and did it again and again until the last Harvard had gone home.

My own aviation fever was intensified no end by having a father who wore the uniform of the Royal Canadian Air Force. In 1940, seized by the patriotism common

among Canadian manhood at the time, he sidestepped his official exemption as a father of five to accept a commission as a pilot officer. At first, he flew a desk in Ottawa as a press liaison officer—natural enough for an ex-newspaperman, but hardly a stage for war heroics. His kids got over the letdown when Dad was assigned to run interference between the RCAF and the Warner Brothers contingent filming *Captains of the Clouds*, one of Hollywood's innumerable morale-stirring war movies, this one glorifying Canada's bush pilots and starring James Cagney. The McCall boys would reap near-royal prestige a few months later by showing up at school wearing our brand-new RCAF-style blue flannel *Captains of the Clouds* wedge caps.

Our RCAF connection next brought us a genuine butter-yellow “Mae West” life-jacket, the very kind worn by Spitfire pilots downed over the English Channel. We never bothered to ask how Dad had acquired this priceless article of the Allied air war. We simply made the most of it, taking turns bobbing about in the local swimming pool wearing that floating pillow while the have-nots stared in envy.

Dad was also assigned to shepherd the young Canadian fighter ace George “Buzz” Buerling across the country on a war bond drive. Dad's diary entries from that tour almost wince in pain: The dashing Buzz, fresh from scoring numerous kills in his Spitfire over tiny, beleaguered Malta, made an unlikely poster boy for the Allied cause. He liked killing people—in their parachutes, if the chance arose—and didn't mind saying so to the Canadian press. Buzz was likely to say just about anything, to my father's horror and the regret of Buzz's RCAF sponsors. (The restless Buerling, who'd known little else in his adult life but air combat, felt adrift in peacetime. He soon hired himself out to the fledgling Israeli air force, only to die in a landing mishap in Cairo in 1948.)

Dad would be posted overseas to the Canadian 6th Bomber Group in Yorkshire,

England, in the summer of 1943, and military souvenirs kept trickling into our hands: the gorgeous blue-and-gold cloth shoulder patch of the U.S. 8th Air Force, cap badges of

The author's fantasy battles in an abandoned Hawker Hurricane included the inevitable dramatic exit from the cockpit.





Behold, the Bolingbroke: a slack-jawed patrol bomber that could set a young imagination on sub-spotting missions.

virtually every extant British Army regiment, booklets of tiny paper cutout models of British aircraft requiring a surgeon's touch to fold and glue to completion. The childish greed for such loot obscured any observations of what was happening to our father. Charged with writing daily morale-boosting profiles of Canada's brave young airmen for home-front consumption, he found himself over and over again interviewing one Lancaster bomber crew after another before a nightly raid—wholesome lads, many of them barely out of high school—only to find the next morning that they were never coming back. He lost his best friend this way, shot down over Arras, France, one June night in 1944. The relentless tragedies left him shattered; within six months, he was repatriated and out of the service. I don't think he ever really recovered, nor did his seething hatred of everything German ever cool.

The ugly realities that made the war such an ordeal for home-front grownups seldom penetrated the make-believe world

of schoolboys. From a kid's perspective it was all mostly pain- and anxiety-free, a living comic strip that began on September 1, 1939, and chronicled one glorious, uninterrupted winning streak. The weekly movie newsreels verified this: It was only enemy ships that were getting sunk, enemy cities bombed flat, enemy planes knocked out of the sky. Only Allied airplane factories were humming, Allied ladies turning out bombs by the thousands, Allied ships sliding down the slips at an almost hourly rate. So far as you could tell from the carefully censored film footage, the D-Day landings were virtually without Allied casualties. There was Pearl Harbor, admittedly, but Japan had outrageously cheated, so that didn't really count. Only years later did I learn that the Dunkirk fiasco hadn't been a victory for our side.

Well past the end of hostilities with Germany and then Japan, my enthusiasm kept my World War II roaring on. Peace be damned, I wasn't ready to abandon all that hard-won warplane intimacy, or the state of perpetual excitement the war in the air had been stirring in me for what seemed to be my entire life. Besides, what thrills could a world at peace provide in their place? Bank robberies?

Four-alarm fires? Stamp collecting?

I decided it didn't have to end after all. Particularly not when, in late 1945, a local farmer acquired a Canadian-built Hawker Hurricane of his very own, through a government program unloading suddenly redundant military aircraft for something like 20 dollars apiece. He parked the Hurricane in a field visible from the highway, to be cannibalized as needed for bits of metal or wire. Propeller and gun-sight and a few vital instruments aside, it was all there: the airplane that had won the Battle of Britain! Over the next couple of years, I hiked out to that farm and climbed into that old fighter every chance I got, my every fantasy bout of aerial combat climaxing with my busting open the starboard-side escape hatch and tumbling out of the cockpit and down off the wing, to live and fly and fight another day.

As in a time-lapse film, the Hurricane—my Hurricane—would, over the months and years, gradually disassemble itself until one gray November day in 1949, I passed by that field and confronted an assemblage of skeletal struts and tubing, no longer a heroic fighter, but a rusting set of monkey bars. My World War II had finally ended. ✈



IT SOUNDS LIKE SOMETHING from a James Bond movie: a massive satellite, the largest ever launched, equipped with a powerful laser to take out the American anti-missile shield in advance of a Soviet first strike. It was real, though—or at least the plan was. In fact, when Soviet President Mikhail Gorbachev walked out of the October 1986 summit in Reykjavik, Iceland, because President Ronald Reagan wouldn't abandon his Strategic Defense Initiative, or SDI, the Soviets were closer to fielding a space-based weapon than the United States was. Less than

cade), designed to destroy an enemy's satellites with missiles fired from another craft in orbit.

Although some details about these programs leaked out in the mid-1990s, it was not until a few years ago, says Siddiqi, that the full extent of the space weapon plans became known, even in Russia. A former press officer in the Russian space industry, Konstantin Lantratov, pieced together the history of Polyus-Skif. "Lantratov managed to dig deep into the story, and his research clearly shows the enormous scale of these battle station projects," Siddiqi says.

SOVIET STAR WARS



WHEN THE WORLD WAS ON THE BRINK OF LASER WEAPONS IN SPACE.

BY DWAYNE A. DAY AND ROBERT G. KENNEDY III

a year later, as the world continued to criticize Reagan for his "Star Wars" concept, the Soviet Union launched a test satellite for its own space-based laser system, which failed to reach orbit. Had it succeeded, the cold war might have taken a different turn.

The spacecraft was known as Polyus-Skif. "Polyus" is Russian for "pole," as in the north pole. "Skif" referred to the Scythians, an ancient tribe of warriors in central Asia—and the European equivalent of "barbarian."

According to Soviet space scholar Asif Siddiqi, a historian at Fordham University in New York City, Moscow began working on space-based weapons well before Reagan kicked the U.S. program into high gear with his March 23, 1983 Star Wars speech. "[The Soviets] funded two massive R&D studies in the late 1970s and early 1980s to explore how to counter imaginary American missile defense ideas," he says. Two concepts emerged: Skif—a laser "cannon" in orbit—and another weapon known as Kaskad (Cas-

"These were not sideline efforts; this was a real space weapons program."

Design work began in the 1970s, not long after the symbolic Apollo-Soyuz "handshake in space" between NASA astronauts and Soviet cosmonauts. The famed Energia organization, which had built the Soyuz crew spacecraft as well as the giant N-1 moon rocket, a program that between 1969 and 1972 suffered four explosions, started studying both the Skif and the Kaskad concepts in 1976. Initially, Energia's plan was to use space-based weapons to shoot down American intercontinental ballistic missiles early in flight, when they were still moving relatively slowly. The Salyut space stations, the first of which was launched in 1971, would serve as the core for either the laser-equipped Polyus spacecraft or the missile-armed Kaskad. The stations could be refueled in orbit and could house two cosmonauts for up to a week.

The designers quickly abandoned this plan, however, and with it the notion of having cosmonauts live on board the Polyus spacecraft. According to Lantratov, the Soviet Ministry of Defense determined that Soviet technology was not up to the challenge of shooting down ICBMs from space, and directed that Skif and Kaskad instead be used to dis-

Mikhail Gorbachev (left, signing an arms treaty with Ronald Reagan in 1987) publicly opposed space weapons, even as the Soviet Union's prototype laser satellite (painted black) sat on the launch pad.



overbought it.” In the summer after Reagan’s Star Wars speech, Under Secretary of Defense Fred Iklé requested a CIA study on how the Soviets might respond. The work fell to three analysts, including Allen Thomson, a senior analyst working for the CIA’s Office of Scientific and Weapons Research. Thomson had studied other Soviet military research programs, including efforts to develop directed-energy weapons and sensors for space-based submarine detection.

He recalls: “The resulting study basically said that both politically and technically, the Soviets had a very wide range of options for responding to foreseeable U.S. SDI developments.” They could build more ICBMs, try to thwart the American

The Soviet military budget was already strained by ground-based defenses (left). Gorbachev (below, third from right, at Energia’s launch pad in May 1987) worried about the cost of a “Star Wars” program.

Gorbachev advisor Roald Sagdeev wrote later in his memoir, “If Americans oversold [the Strategic Defense Initiative], we Russians overbought it.”

able American anti-missile satellites—which didn’t yet exist, and hadn’t even been approved.

Although the United States also had spent considerable amounts of money in the 1950s and 1960s trying to develop a missile defense system, by the mid-1970s this work was winding down, and during Jimmy Carter’s presidency, progress on anti-missile systems was minimal. In 1972, both superpowers had signed the Anti-Ballistic Missile Treaty, which limited each to two anti-missile launch sites, one to defend the capital city and one to defend a single base from which ICBMs could be launched.

But the ABM Treaty forbade only the *deployment* of anti-missile weapons, not testing or development, a loophole both sides exploited. Beginning about 1980, when Reagan won the presidency, scientists at the Lawrence Livermore National Laboratory in California (among them physicist Edward Teller, the so-called father of the H-bomb), along with researchers at other federal labs and a handful of mil-

itary and civilian policymakers, began looking at “directed energy” weapons—which shoot beams instead of bullets—as a way to neutralize an increasing Soviet advantage in launchers and strategic missiles.

Reagan was taken with the idea, and three years later, in a televised speech on national security, he announced a plan to build a defensive shield to “make nuclear weapons impotent and obsolete,” essentially changing the nation’s strategic posture from offense to defense. The proposal was immediately attacked by Democrats in Congress, who called it unworkable; it was the late Senator Ted Kennedy who tagged it with the moniker “Star Wars.” Despite the skeptics, funding for missile defense increased dramatically, and reached nearly \$3 billion a year by 1986.

As prominent planetary scientist and Gorbachev advisor Roald Sagdeev wrote in his 1994 memoir *The Making of a Soviet Scientist*, “If Americans oversold [the Strategic Defense Initiative], we Russians



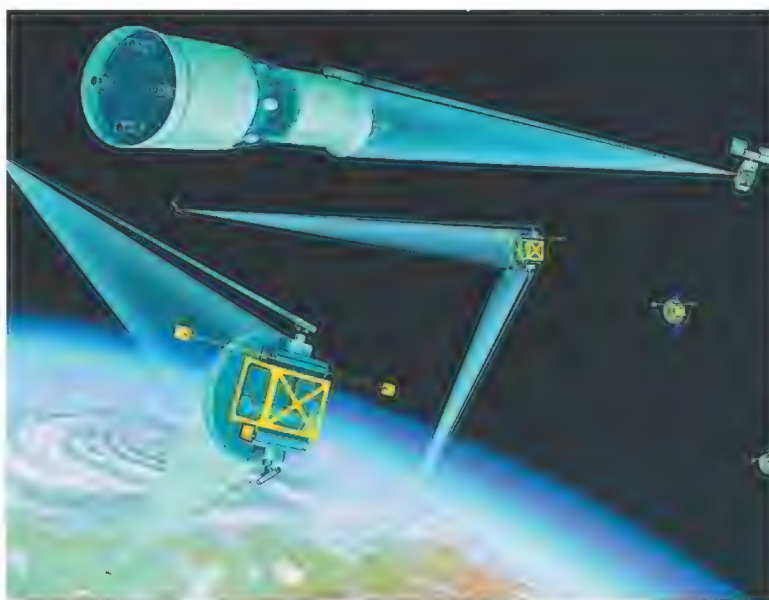
missile shield, or attempt to drum up international opposition to the American plan. “There was some recognition that the USSR might be financially strapped if it had to initiate new major weapons systems. But there was no indication that it would be *unable* to respond,” Thomson says.

In fact, Reagan’s SDI served as an instant kick in the pants for the Soviet space weapons program, giving the aerospace design bureaus the ammunition they needed to persuade the Politburo to increase funding for Polyus and Kaskad.

Both projects had been simmering at the Salyut (now Khrunichev) bureau within Energia, and experiments with high-powered lasers for anti-missile work had been under way since 1981. So far the work had been confined to the laboratory, however. Now, in the wake of Reagan's speech, the rubles started flowing for actual flight hardware. The motive wasn't so much fear that the SDI might prevent Soviet missiles from reaching their targets, but something more ominous, and weirder: a conviction that the Americans were about to set up battle stations in space.

Paranoid fantasies weren't uncommon among senior Soviet generals, according to Peter Westwick, a history professor at the University of California at Santa Barbara who has written about science during the cold war. "They thought that maybe the [U.S.] space shuttle was going to be doing shallow dives into the atmosphere and

couldn't figure why you would need a vehicle like that, one that made no economic sense," Siddiqi explains. "So they figured that there must be some unstated military rationale for the vehicle—for example, to deliver and recover large space-based weapons platforms, or to bomb Moscow." The Soviets responded to the perceived threat by building their own space shuttle, a near-exact copy of NASA's,



While the United States pursued its Strategic Defense Initiative, analysts speculated on what the enemy was up to. This artist's concept of beam weapons in orbit graced the cover of a 1987 Pentagon brochure on Soviet space power.

which made a single flight and was then retired in 1993 (see "White Elephant," Dec. 2002/Jan. 2003).

Shortly after Reagan's speech, the Soviet Academy of Sciences was asked to assess whether a space-based missile shield was feasible. Evgeny Velikhov, a prominent physicist, led the study group. Their conclusion, says Westwick, was " 'We looked at it, we studied it, we determined that it wouldn't work.' " But other Soviet scientists were more alarmist, and succeeded in convincing military and political leaders that even if the SDI wasn't an effective missile shield, it could be used offensively, to hit targets on the ground.

The idea of orbiting lasers shooting at Soviet territory was truly terrifying. According to Westwick, the theories that floated through the Kremlin about the real purpose of the SDI got batty: "Selective political assassination. Say the Politburo is standing outside on May Day and a single laser could take them all out.... These things are overhead, they're invis-

ible, but with zero warning they could zap you."

With such frightening scenarios in mind, the Soviet military accelerated work on the Polyus-Skif laser cannon to destroy SDI satellites. Up until then, the plan had been to use a powerful laser built by the Astrofizika design bureau. But that program had fallen behind; the Astrofizika laser and its power systems were too big and heavy for existing rockets to launch. So when Soviet engineers were told to pick up the pace on Skif, they came up with an interim plan. They would adapt a small, one-megawatt carbon dioxide laser that had already been tested on an Il-76 transport aircraft as a weapon against missiles. In August 1984, the new spacecraft was approved and designated Skif-D, the "D" standing for the Russian word for "demonstration." By January 1986, the Politburo had designated the project as one of the Soviet space program's highest-priority satellites.

Meanwhile, U.S. scientists and engineers were having their own problems with space-based lasers. As research proceeded on projects like Zenith Star, which investigated the problems of placing a two-megawatt chemical laser in orbit, the challenges of building and launching such systems became clearer. The SDI organization funded studies of particle beams and an X-ray laser that would be set off by a nuclear explosion, but none of these projects ever came close to being deployed. By 1986 the SDI leadership was shifting its attention away from orbiting lasers and toward small "kinetic kill vehicles," which could bring down enemy satellites by crashing into them.

The Soviets, though, stayed the course, and kept working on the demonstration version of their space-based laser, with a target launch date of early 1987. Engineers at the Salyut design bureau soon realized that the laser and its power system—even the smaller one already tested on an aircraft—were still too big for the Proton rocket. But a bigger launcher was in the pipeline: The Energia rocket, named after its design bureau, was being built to carry the new Buran space shuttle into orbit. Energia could carry 95 tons to space,



deploying hydrogen bombs," he says.

Siddiqi elaborates on how the Soviets misinterpreted U.S. intentions for the space shuttle: "To the Soviets, the shuttle was the big thing. It was a sign to them that the Americans were about to move war into space." The official U.S. explanation was that the spaceplane, which debuted in 1981, was to provide routine access to orbit. By the mid-1980s, however, it was also being used to launch classified military satellites (see "Secret Space Shuttles," Aug. 2009). "The shuttle really scared the Soviets big-time because they

so it could carry Skif-D. The rocket was switched. To keep costs down, engineers looked for other existing hardware to modify and incorporate, including elements of Buran and a part of the canceled Almaz military space station designated the TKS, which later became the core module of the Mir space station.

Skif-D grew into a Frankenstein's monster: 131 feet long, more than 13 feet in diameter, and weighing 210,000 pounds, more massive than NASA's Skylab space station. The complex consisted of what the Russians called a "functional block" and a "purposeful module." The functional block was equipped with small rocket engines to place the vehicle into its final orbit. It also included a power system, using solar panels borrowed from Almaz. The purposeful module carried carbon dioxide tanks and two turbo-generators to produce the laser's power, as well as the heavy rotating turret, which pointed the beam. The Polyus spacecraft was built long and thin so that it could fit on the side of the Energia, attached to its central fuel tank.

Designing a laser cannon to work in orbit was no small engineering challenge. A hand-held laser pointer is a relatively simple, static device, but a big gas-powered laser is like a roaring locomotive. Powerful turbo-generators "pump" the carbon dioxide until its atoms become excited and emit light. The turbo-generators have large moving parts, and the gas used in the formation of the laser beam gets very hot, so it has to be vented. Moving parts and exhaust gases induce motion, which poses problems for spacecraft—particularly one that has to be pointed very precisely. The Polyus engineers developed a system to minimize the force of the expelled gas by sending it through deflectors. But the vehicle still required a complex control system to dampen motions caused by the exhaust gases, the turbo-generator, and the moving laser turret. (When firing, the entire spacecraft would be pointed at the target, with the turret making fine adjustments.)

The system was complicated enough

that by 1985, the designers knew that testing its components would require more than one launch. The basic Skif-D1 spacecraft structure was proved out in 1987, while the laser wouldn't fly until Skif-D2, in 1988. Around the same time, another, related spacecraft went into development.

of their spacecraft earlier than scheduled?

They quickly drew up plans for a vehicle that would test the functional block's control system and additional components, like the gas ejection vents and a targeting system, consisting of a radar and a low-power fine pointing laser, that would



The theories that floated through the Kremlin about the real purpose of the SDI got batty: "Say the Politburo is standing outside on May Day and a single laser could take them all out..."

Designated Skif-Stilet (Scythian-Stiletto), it was to be equipped with a weaker infrared laser based on an operational ground-based system. Skif-Stilet could only blind enemy satellites by targeting their optics. Polyus would have enough energy to destroy a spacecraft in low Earth orbit.

Work on these projects was proceeding at a furious pace throughout 1985 when an unexpected opportunity arose. The Buran shuttle had fallen behind schedule, and wouldn't be ready in time for the planned first launch of the Energia rocket in 1986. The rocket's designers were considering launching a dummy payload instead, and Skif's designers saw an opening: Why not test some of the components

be used in conjunction with the big chemical laser. They labeled the spacecraft Skif-DM, for "demonstration model." Launch was scheduled for fall 1986, which would not affect the launch of Skif-D1, planned for the summer of 1987.

Meeting such a tight deadline had a human cost. At one point, more than 70 firms within the Soviet aerospace industry were working on Polyus-Skif. In his history of the project, Lantratov quotes from an article by Yuri Kornilov, the lead Skif-DM designer at the Khrunichev Machine Building Factory: "As a rule, no excuses were accepted—not even the fact that it was almost the same group of people who, at that time, were performing the grandiose

work associated with the creation of Buran. Everything took a back seat to meeting the deadlines assigned from the top.”

The designers realized that once they launched the huge craft into space and it expelled large amounts of carbon dioxide, American intelligence analysts would observe the gas and quickly figure out that it was intended for a laser. So the Soviets switched to a combination of xenon and krypton for the Skif-DM venting test. These gases would interact with ionospheric plasma around Earth, and the spacecraft would appear to be part of a civilian geophysics experiment. Skif-DM would also be equipped with small inflatable balloon targets, mimicking enemy satellites, that would be jettisoned in flight and tracked with the radar and the pointing laser.

The launch of the demonstration satellite slipped to 1987, partly because the launch pad had to be modified to accommodate a rocket as heavy as Energia. The technical problems were relatively minor, but the delay had a critical impact on the project’s political fortunes.

In 1986, Gorbachev, who had been general secretary of the Communist Party for only a year, was already advocating the sweeping economic and bureaucratic reforms that would come to be known as

perestroika, or restructuring. He and his government allies were intent on reining in what they saw as ruinous levels of military spending, and had become increasingly opposed to the Soviet version of Star Wars. Gorbachev acknowledged that the American plan was dangerous, says Westwick, but warned that his country was becoming obsessed with it, and began challenging his advisors: “Maybe we shouldn’t be so afraid of SDI.”

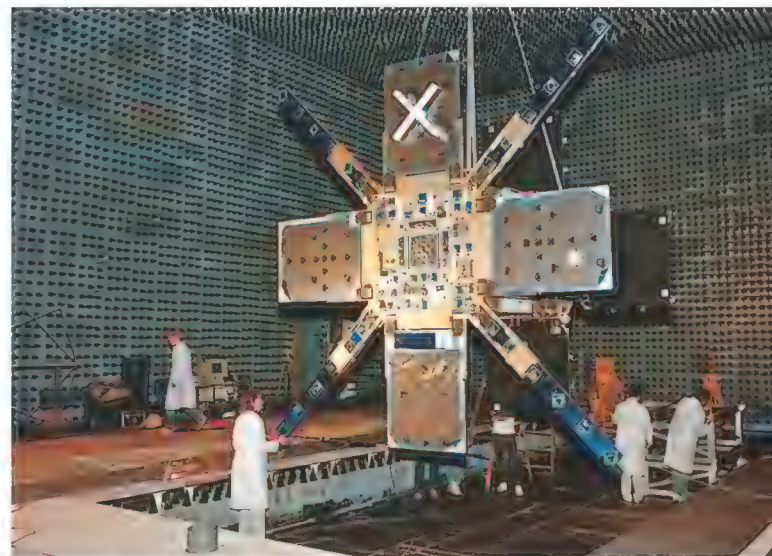
In January 1987, with Skif-DM’s launch just weeks away, Gorbachev’s allies in the Politburo pushed through an order limiting what could be done during the demonstration flight. The spacecraft could be launched into orbit, but could not test the gas venting system or deploy any of the tracking targets. Even while the vehicle was on the pad, an order came down requiring several of the targets to be removed, but spacecraft engineers pointed out the dangers of interacting with a fueled rocket, and the order was canceled. Still, the number of experiments was reduced.

That spring, as the booster lay horizontally inside a vast assembly building at the Baikonur Cosmodrome in Kazakhstan, the Skif-DM was mated to its Energia rocket. Technicians then painted two names on the spacecraft.

that may have been less an attempt to fool foreign spies about the mission’s purpose than an advertisement for the Energia company’s new project.

The rocket was rolled out to the launch pad and hoisted to the vertical launch position. Then, on the night of May 15, 1987, Energia’s engines lit and the giant rocket climbed into the sky. Whereas most launches from Baikonur head for an orbit inclined 52 degrees to the equator, Polyus-Skif traveled farther north, on a 65-degree inclination. If the worst happened, this heading would keep rocket stages and debris—or the entire Skif-DM—from falling on foreign territory.

The Energia rocket performed flawlessly, gaining speed as it rose and arced out toward the northern Pacific. But the



The Soviet Skif-DM (left) and the U.S. LACE satellite for testing atmospheric effects on lasers (above) were rare birds: space weapon research projects that actually made it to the launch pad.



Opposite: The U.S. Army’s Homing Overlay Experiment (now in the Smithsonian) showed in 1984 that a missile could destroy a dummy warhead.

One was “Polyus.” The other was “Mir-2,” for the proposed civilian space station that Energia’s leadership hoped to build. According to Polyus historian Lantratov,

kludged nature of the Skif-DM test spacecraft, along with all the compromises and shortcuts, spelled its doom. The satellite’s functional block had originally been designed for the Proton launcher, and couldn’t withstand the vibration of the Energia’s more powerful engines. The solution had been to mount the spacecraft with the control block at the top instead of down near the engines. Essentially, it flew into space upside down. Once the spacecraft separated from its booster, it was supposed to flip around to point away from Earth, with the control block’s engines facing down toward Earth, ready to fire and push the craft into orbit.

Skif-DM separated on cue, the spent Energia fell away, and the protective shroud

Soviet and U.S. aircraft (a Tu-95 Bear above, an F-4 Phantom II below) had been playing cat-and-mouse for years, but the cold war's endgame turned out to be a standoff over missile defense.

over the front of the spacecraft separated. Then the entire spacecraft, as tall as a 12-story building, began its gentle pitch maneuver. Its tail end, actually the front of the spacecraft, swung up through 90 degrees, through 180 degrees...then kept going. The massive spacecraft tumbled end over end for two full revolutions, then stopped with its nose pointing down toward Earth. In the rush to launch such a complicated spacecraft, the designers had missed a tiny software error. The engines fired, and Skif-DM headed back into the atmosphere it had just escaped, quickly overheating and breaking into burning pieces over the Pacific Ocean.

In the West, the debut of the Energia super-rocket was reported as a partial success; though the satellite had failed, the launcher itself operated perfectly. The U.S. government almost certainly had intelligence sensors pointed at the rocket as it flew, but what the CIA or other agencies concluded about the payload remains classified.

The failure of Polyus-Skif, combined with its immense expense, gave the program's opponents the ammunition they needed to kill it. Further Skif flights were canceled. Hardware being prepared was either scrapped or shoved to the sides of giant warehouses. And the laser never got close enough to launching for anyone to judge whether it would have worked.

In his history of the project, Lantratov quotes Yuri Kornilov, the Skif-DM lead designer: "Of course, no one received any prizes or awards for their feverish, two-year-long, under-the-deadline work. The hundreds of teams that had created Polyus were not given an award or a word of thanks." In fact, after the Skif-DM fiasco, some were reprimanded or demoted.

We still don't know the entire story. "Even today, there's a lot of sensitivity about the whole program," says Siddiqi. "Russians don't like to talk too much about it. And our understanding of Soviet responses to SDI still remains murky. It's clear that there was a lot of internal debate within the Soviet military-industrial elite about the effectiveness of space



"The fact that the Soviets came so close to launching a weapon platform suggests that the hardliners were in the driver's seat," says Asif Siddiqi. "It's scary to think what might have happened if Polyus had actually made it to orbit."

weapons. And the fact that the Soviets came so close to actually launching a weapon platform suggests that the hardliners were in the driver's seat. It's scary to think what might have happened if Polyus had actually made it to orbit."

Russian space engineers, who are known for being pack rats, may have had the last laugh. The first component of the International Space Station to be launched was the Russian Zarya ("Dawn") module, also known as the Functional Cargo Block. The vehicle was built in the mid-1990s, under contract to NASA, by the enterprising engineers at the Khrunichev factory, who produced it on time and on budget. The main purpose of Zarya is to supply

electrical power and to reboot the station, the same role the Skif's functional block would have served. Some Soviet space watchers believe that Zarya began life as a flight spare originally built for the Polyus program. Dusting off old but perfectly usable hardware—or even just blueprints—would certainly have helped Khrunichev meet its production schedule for the space station module during the economic chaos that prevailed in Russia after the cold war. It's only speculation, but if true, it would mean that the old Soviet Union ultimately succeeded in getting a tiny piece of its Star Wars system into orbit. The irony is that the American taxpayer picked up the tab. ✈

Deadstick Landings

From the sublime to the ridiculous.

BY TOM LECOMPTE | ILLUSTRATIONS BY DAVID CLARK

IT'S A BIT OF A MYSTERY HOW the aeronautical lexicon came to include “deadstick.” When the engine goes dead, the control stick remains effective. The word emerged from Britain’s Royal Air Force during World War I, so one guess is that in the era of wooden propellers, an engine failure reduced the propeller’s usefulness to that of a dead stick.

During the war, engine reliability was so poor that pilot recruits had to prepare for the likelihood—not just the possibility—that an engine would quit. They were taught to land within a 150-foot-diameter circle with the engine off. Today, engines are so reliable that most pilots will never have to make a forced landing; nevertheless, in flight training, engine-out procedures are still standard. To prevent a simulated emergency from turning into a real

one should the engine fail to restart, instructors simply pull the throttle to idle and direct students to set up an approach to a suitable landing site, then add power before touching tires to ground.

Still, deadstick landings do happen. If an aircraft loses power, a useful number to know is the aircraft’s glide ratio: the ratio of horizontal distance traveled to vertical distance descended. Say, for instance, a paper airplane travels 30 feet for every five feet it falls. Its glide ratio—30 divided by 5—is 6.

Modern glider: 70

Hang glider: 15

Boeing 767: 12

Space shuttle orbiter during approach: 4.5

Human body: 1

Least Graceful Deadstick Landing

AGRICULTURAL PILOT Boyd Morgan was flying over pasture land along a ridge near his home in Belgrade, Montana, in 1982 when the engine on his Cessna Husky quit. Barely 20 feet off the ground, Morgan didn’t have a lot of options. Pushing the nose down to preserve airspeed, he headed straight for the trees,



aiming for a spot between them so that the wings, rather than the cockpit, would bear the brunt of the impact. Then the wind shifted. The airplane stalled and cartwheeled. Morgan ended up upside down about six feet off the ground, hanging by his shoulder straps. He got his seat belt unfastened, but as he fell through the open cockpit door, the door handle caught his pants, pulling them around his ankles. Other than a wrecked airplane and injured dignity, Morgan came away relatively unscathed. “It wasn’t funny then,” he says, “but I can laugh about it now.”



Most Graceful Deadstick Landing

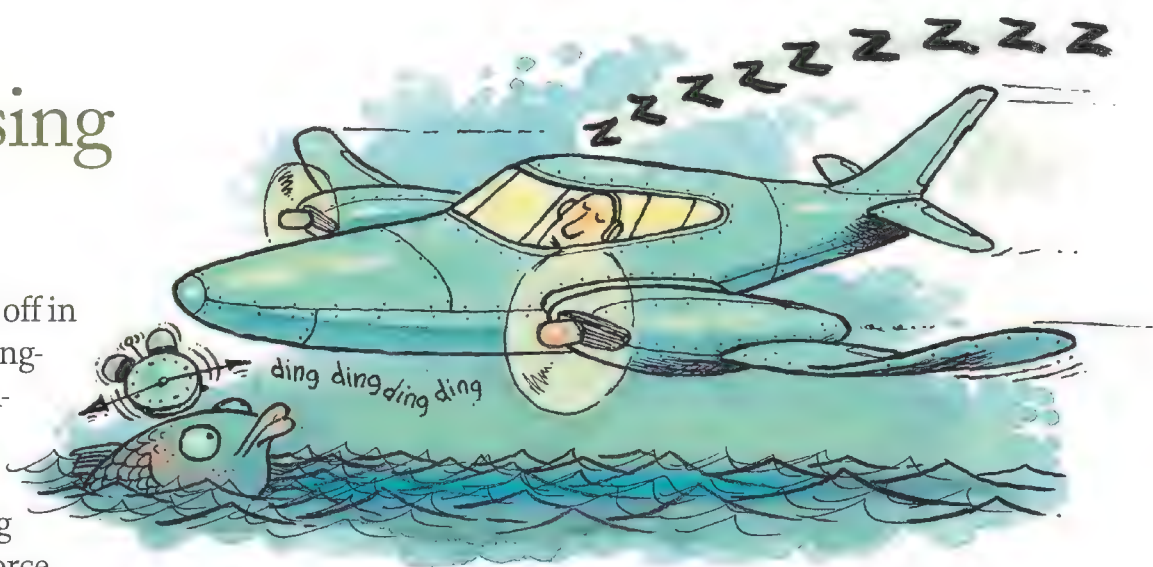
THE LEGENDARY BOB HOOVER designed an entire airshow routine around a deadstick landing. Adapting a training exhibition he did for pilots learning to fly the twin-engine Lockheed P-38, Hoover flew a twin-engine Rockwell Shrike Commander, a business aircraft never designed for aerobatics, in a performance that culminated with a low-level, high-speed pass in which he shut down both engines; did a loop, an eight-point hesitation roll, and a 180-degree turn; “danced” the Shrike down the runway, touching the left landing gear to the pavement and then the right; and finally coasted to a stop at show center. Hoover called it the energy management maneuver—converting potential energy (altitude) to kinetic energy (airspeed) and back—and dedicated it to another Rockwell product, the space shuttle, which also glides to a landing without power.

Best Ditching (Deadstick Landing on Water)

THE MOST FAMOUS example in recent years: After a US Airways Airbus A320’s engines ingested Canada geese and shut down last January, Chesley Sullenberger and copilot Jeffrey Skiles set the aircraft down in New York City’s Hudson River. All 155 passengers and crew members evacuated onto the wings and were quickly retrieved by watercraft.

Most Embarrassing Ditching

IN FEBRUARY 1994, Alan Clark took off in his twin-engine Piper Seneca from Springfield, Kentucky, bound for Crossville, Tennessee, a hop of less than an hour. Clark awoke five hours later, in the dark and over water. He radioed a mayday, reporting that he was running out of fuel. Air Force and Coast Guard aircraft patrolling the Gulf of Mexico found Clark 210 miles south of Panama City, Florida, and led him toward the closest airport. Clark was about 70 miles west of St. Petersburg when both engines quit from fuel exhaustion. Clark ditched the airplane, and a Coast Guard helicopter plucked him from the water, uninjured. In its summary report, the National Transportation Safety Board cited “the pilot’s physiological condition (failure to remain awake)” as a significant contribution to the accident. The airplane sank and was not recovered.



Most Frequent Deadstick Landings

FOR GLIDER PILOTS, every landing is deadstick. Like Bob Hoover (a glider pilot himself), glider pilots also employ energy management to stay aloft. But even without the advantage of a glider's light weight and high glide ratio, any airplane with sufficient altitude should be able to glide to a safe landing.

Deadstick Landing That Saved the Most Lives

DUE TO A LEAK in a fuel line to the right engine, Air Transat Flight 236, an Airbus A330 carrying 306 people from Toronto, Canada, to Lisbon, Portugal, in August 2001, ran out of fuel over the Atlantic Ocean. After discovering that fuel was low, captain Robert Piché declared an emergency and diverted to Lajes Air Base in the Azores, but at 39,000 feet and 150 miles out, the right engine quit. Thirteen minutes later, the left engine followed suit. Relying on a ram air turbine to supply limited power to

hydraulic and electrical systems, Piché guided the airliner to the runway. Crossing the runway threshold at 230 mph, 70 mph faster than recommended, the airplane used three-quarters of the 10,000 feet of concrete to bounce, then screech to a halt. Fourteen passengers and two crew members were injured during the evacuation. Piché's reward: partial blame for, among other things, not recognizing the problem sooner.





All About Autorotation

WHEN A HELICOPTER engine quits, the aircraft “autorotates”: The rotor blades spin freely in the wind. Using a combination of the cyclic control stick, the collective, which controls the pitch of the blades, and the pedals controlling the tail rotor, a pilot can alter the speed of the spinning blades, and by increasing their pitch, somewhat slow the descent for what is hoped will be a soft landing. Roger Stradley, a 62,000-hour commercial pilot who has done a little of everything in aviation—charters, flying and repairing helicopters, aerial agricultural work, firefighting, gliding, flight instruction—says the only time he lost an engine was in a Bell 47 Super G helicopter while doing a magazine photo shoot in the mountains near Big Sky, Montana. He managed to autorotate the Bell onto a highway leading up a mountain canyon, but no sooner had he set down when he saw a propane truck coming at him. “I thought we were goners,” Stradley says. But the truck cab just missed the cockpit, and the helicopter blades glanced off the top of the rounded tank. “I was more afraid of telling my wife what happened than of going to the Great Hereafter,” he adds.

How to Make a Deadstick Landing

WILLIAM KERSHNER, author of many volumes on flight instruction, notes in *The Student Pilot's Flight Manual*: “As one instructor put it, ‘hit the softest, cheapest thing in the area as slowly as possible,’ which pretty well covers it.”

A Most Unusual Autorotation

VINTAGE AIRCRAFT SPECIALIST Andrew King was making a fourth test flight of a rare 1932 Pitcairn PA-18 Autogiro in July 2008 when at 2,000 feet and a mile from the New Castle, Ohio airfield, the fuel pump quit. King was especially well suited to handle the situation. He had trained on a gyroplane, which operates on the same aerodynamic principles as the Autogiro, and had consulted with, among others, the late Steve Pitcairn, son of the aircraft’s builder, Harold Pitcairn, and the late Johnny Miller, then 101, who last flew that very aircraft in 1939. Still, King had to determine the flight characteristics of the Pitcairn pretty much by feel. Being close to the airport, “I was in a good spot, relatively speaking,” he says. He pitched the nose for what he guessed was the best glide speed and headed for the airfield. The rotor on an Autogiro spins freely, always in autorotation, with the spinning rotor providing lift. With the engine out, the drag produced by the aircraft’s 40-foot-diameter blade made for a very steep descent, King says. When he got to the airfield, at an altitude of 800 feet, King pulled the control wheel all the way back. Unlike an airplane, King says, with the Autogiro “you can’t stall it; you can’t spin it, which was the whole safety concept” underlying its design. The Autogiro simply “dropped like a parachute.” At about 200 feet, King pushed the stick forward a bit and made a normal landing and rollout of 50 feet.

A Harrowing Deadstick Landing

AIR NATIONAL GUARD Captain Chris H. Rose was the fourth in a flight of four F-16s, at 13,000 feet, returning to Andrews Air Force Base outside Washington, D.C., in June 1996 from a training mission at a North Carolina bombing range. When he pushed the throttle forward, he heard a loud bang. "I didn't know what it was, but it didn't sound good," he later told a National Guard reporter. "Then the vibration started. The distortion was incredible. The whole airplane was buzzing." Rose immediately turned toward the Elizabeth City Coast Guard air station, but he was above a layer of clouds and could not see the base. His fellow pilots helped direct him, and at 6,000 feet Rose broke out of the clouds and saw the runway. He had to jettison two fuel tanks, empty but still heavy, and he feared they might hit a house in the neighborhoods below (they landed harmlessly in a back yard). Like Piché, he crossed the runway threshold 80 mph faster than usual and used the emergency braking system, taking most of the 7,200-foot runway to stop. Rose's feat won him the Koren

Kolligian Jr. Trophy, an Air Force award for meritorious handling of an inflight emergency, and today the cockpit-camera video of his ordeal is a big hit on YouTube.



The Ultimate in Energy Management

THE SPACE SHUTTLE'S approach to landing begins at 400,000 feet over the Pacific, when the orbiter reenters the discernable atmosphere. At 50,000 feet, about 25 miles from the runway, the flight commander takes control. The orbiter rolls out on final approach at 10,000 feet, eight miles from the runway, at 320 mph in a steep descent with the nose as much as 19 degrees below horizontal, at a descent rate 20 times that of an airliner. At 80 feet, the commander begins to flare, bringing the nose up to slow the descent rate and crossing the threshold at some 220 mph. After touchdown, the drag chute deploys, and the orbiter uses about 8,000 feet to coast to a stop. Time elapsed since the commander took control: about five minutes. ➤

Resto

Kentucky Panther | Grumman F9F

HALF A CENTURY of Winona, Minnesota winters had made a weary sight of the Grumman F9F Panther. When Dan Cherry saw a photo of it at a Web site that aviation artist Jerry Anderson alerted him to, he decided to rescue it. "I looked at all the grass growing up around it," says Cherry, director of the Aviation Heritage Park, a new aviation museum in Bowling Green, Kentucky, "and I thought, *Wow, they probably don't want that airplane.*" Cherry wanted to honor fellow Kentuckian John Magda, who flew Panthers as the lead pilot of the U.S. Navy Blue Angels. Born in 1918 in Kentucky, Magda flew at the Battle of Midway and survived a ditching and five days in a life raft. In March 1951, North Korean anti-aircraft fire critically damaged his Panther, and Magda died trying to ditch the airplane. He was 32, and left a widow and two children. In 2007, he was inducted into the Kentucky Avia-

tion Hall of Fame, and Cherry wanted to mark Magda's legacy with a Panther display. Though Cherry never knew Magda, he greatly admires his record of service. Cherry flew the McDonnell F-4 Phantom II in Vietnam, and was a flight leader for the U.S. Air Force Thunderbirds.

Panthers entered service in 1949, and a total of 1,385 were built. The Navy took delivery of this Panther, Bureau of Aeronautics number 125992, on April 24, 1952, and assigned it to Marine Fighter Squadron 224 at the Marine Corps Air Station at Edenton, North Carolina. In 1953, it went to Japan, serving at Naval Air Stations Atsugi and Yokosuka. After stints at California's NAS Alameda and MCAS El Toro, it ended up in the Naval Reserve at NAS Minneapolis. In July 1959, having logged 2,343 hours, it was retired.

For the next couple of decades, the Panther squatted at Winona's Lake Park. In the 1980s, it was moved to Max Conrad Field, where it eventually roosted in the grass between the runway and the ramp, the Mississippi River occasionally rising into the wheel wells. In Jan-

uary 2008, All Coast Aircraft Recovery showed up, sent by the Heritage Park, and took off the wings and part of the tail, then loaded the pieces onto a flatbed truck for the three-day drive to the Bowling Green-Warren County Regional Airport. There, All Coast reassembled it, and Heritage Park's volunteers went to work. "The tires had been in the mud axle-deep," says Larry Beam, the Park's restoration chairman. "The brakes were rusted together. There was a lot of grinding, but we got them turning." The group removed sticks and cans, pressure-washed the airplane, then rolled it indoors to a donated corner of a maintenance hangar. They began taking off pieces of the skin—"Those screws have been in there since 1952,



All Coast Aircraft Recovery removed the wings (left) at Minnesota's Max Conrad Field for the ride to the Panther's new home in Kentucky.



Volunteer Joe Leudenburg (right), inside the engine bay, is flanked by two jet intakes. A third, above him, let in more air for ground operations. Yellow-green zinc chromate primer impeded corrosion of the interior for almost 60 years.



ration

and they do not want to come out,” says Beam. The team found blows from an axe. Some of the gouges had been patched in the 1980s during a quick fix by a technical college in Winona.

The group removed more grime and rust by blasting it with an ingredient that doesn't heat and warp the airplane's skin, as sand blasting would. With a micro-aluminum epoxy compound that, once dry, can be sanded, they repaired hundreds of dents and holes. They acquired a canopy from a collector in Texas, but may have to cut a new tailhook if they can't find an original. They'll paint the airplane—PPG Aerospace donated all paint—in Blue Angel colors, with Mag-



Ports such as gun smoke vents (opposite) had been covered in an earlier patch job with odd pieces of metal. Once these were pried off, the Panther was given a cleansing blast (above) to scour away remaining rust and stains. All the instruments had been removed at retirement, but the group plans to restore the cockpit (right, top) to a state that John Magda (right, mounting his Blue Angel Panther in 1950) would recognize.

da's name lettered near the cockpit. He led the Blues flying F9F-2s. The Park's Panther is an F9F-5, which the squadron flew from 1951 to 1954. The -5 is 17 inches longer and 10 inches taller. Although it has no engine, Cherry appreciates the wording in the Navy's restoration compliance documents: "It should look like it could fly." The jet is on loan from its true owner, the National Naval Aviation Museum in Pensacola, Florida.

As the first of Grumman's jet fighters, the Panther was the last of its straight-wings. Those wings came in handy one day in September 1951 for Neil Armstrong, barely 21 years old. On a low bomb run over a North Korean target, Armstrong struck a cable that sheared off six feet of his right wing. The future moonwalker was able to climb and head south, applying lots of aileron to maintain level flight long enough to eject over the South Korean coast.

Magda's daughter Marni, now a retired English teacher in California, is writing a book about her father. "Growing up, I knew him as a war hero only," she says. But through letters Magda wrote to her mother, who died in January 2009, Marni is see-

ing her father's human side. "I've found he was so concerned about family, so worried about his wife and kids. I'd never known that side of him."

At the Aviation Heritage Park's annual hangar party in June 2008, retired naval aviator Richard Bradberry, who had flown as Magda's wingman the day he was shot down, walked around the half-restored Panther, his blue eyes gleaming. "This was just a sweet-flying airplane, like most Grummans," said Bradberry. "And tough, like all of them." He laughed. "The Grumman Iron Works!"

BARRETT TILLMAN

PHOTOGRAPHS BY JOHN FLECK



COURTESY MARNI MAGDA



SLIM BUD

A CONVERSATION WITH AN
OLD FRIEND REVEALS A
DIFFERENT SIDE OF
CHARLES LINDBERGH.

BY GIACINTA BRADLEY KOONTZ

CHARLES LINDBERGH'S ACCOUNT

of his record-setting transatlantic flight, *We*, was rushed to press in 1927. He later admitted that “being young, and easily embarrassed” and wanting to present only the most positive image of aviation, he left out what he called “much of greatest interest.” Acutely aware of his place in history, Lindbergh wrote again, in greater detail, of his famous solo flight, publishing *The Spirit of St. Louis* in 1953. It won a 1954 Pulitzer Prize.

Lindbergh's belief that the history of aviation should be told reached beyond his own part in it. He often encouraged pioneering aviators, including Orville Wright, to write their memoirs. For years Wright dodged the opportunity to tell his story, even while objecting to the errors introduced when others told it for him. “It is a tragedy,” Lindbergh wrote in his diary in 1939, “for Wright is getting well on in years, and no one else is able to tell the story as he can.”

Another pilot whose story Lindbergh thought deserved to be told was his clos-

est friend, Harlan A. “Bud” Gurney. Since his first airplane ride, in 1922, Gurney had been beside Lindbergh, later becoming, like Lindbergh, an airmail pilot, and afterward a captain with United Airlines and a restorer of vintage aircraft. It was Gurney whom Lindbergh trusted as technical advisor on the 1957 film *The Spirit of St. Louis*, starring Jimmy Stewart.

During barnstorming trips in the early 1920s, Gurney, then 18, and Lindbergh, 21, shared stories around the campfire, and had lazy afternoon conversations under the wing of Lindbergh's Curtiss JN-4 Jenny. Certainly, no one knew Lindbergh better as a young adult than Gurney, and vice versa.

Both Lindbergh and Gurney were independent children, and, as teenagers, accepted adult responsibilities. They were both handsome, yet shy with girls; mechanically gifted, and adventure-some.

In 1969, Lindbergh, then 67, and Gurney, 64, met in the Gurneys' California home. While Gurney's wife, Hilda, puttered in the kitchen and the tape recorder spun, Lindbergh interviewed Gurney. It may be the only time Lindbergh was on the opposite end of a microphone.

Give a brief outline, if you could, [of] where you were born and how you started out at Lincoln. How you got to the sand hills of Nebraska.

— Charles Lindbergh

The one-and-a-half-hour interview has been heard only by those close to the Gurney family, and visitors to their hangar. In the interview, Gurney refers to the man beside him alternately as “Charles Lindbergh,” or “Slim,” a nickname for which Gurney often took credit. When they first met, Lindbergh called his friend “Buddy,” which he later shortened to “Bud”; it stuck for the rest of Gurney's life.

The first 40 minutes of the interview are devoted to Gurney's childhood. He struck out on his own at age 13, when he learned his family didn't have enough money to buy his schoolbooks.

The rest of the interview supports what is known of Lindbergh's arrival at the Lincoln Aircraft Corporation to sign up for flying lessons in 1922; Lindbergh's and Gurney's first flight, side by side in Otto Timm's Lincoln-Standard J-1; and other adventures to which Gurney adds his own impressions.

In contrast to Lindbergh, Gurney never downplayed the danger of early fly-

Charles Lindbergh (left) and Harlan Gurney (with a Lincoln-Standard J-1, ca. 1922) would remain lifelong friends.

ing. Gurney often feared for his life, even then thinking that some stunts were “an idiot thing to do.” At least two barnstorming adventures are mentioned in the interview that do not appear in books written by or about Lindbergh.

To say Lindbergh and Gurney were both reckless and brave would be an understatement. Although they were to perform in aerial circuses as wingwalkers and make double and triple parachute drops, Gurney’s first jump was prompted by a dare from Lindbergh.

Circling over the fields of Lincoln, Nebraska, Gurney jumped from an airplane piloted by his employer, Ray Page, and dropped into the garden of Mrs. O’Sullivan. As he descended, he heard her shout warnings not to land in her bean patch. He also saw a cloud of dust headed his way, created by Lindbergh on his Excelsior motorcycle, racing in such haste to pick him up that he fell off. Elated with their success, the boys celebrated with ice cream.

Lindbergh and Gurney sometimes disagreed on details. When Gurney reminded Lindbergh about getting a lot of press by performing “dangerous stunts” with Page’s Aerial Circus and almost be-



Gurney – billed as “the world’s youngest parachute jumper” by Page’s Aerial Circus – earned \$11 to \$25 a performance, and cash for every passenger he took aloft.



ing arrested for recklessness, Lindbergh claimed that he did not remember, adding that the act wasn’t that

spectacular; “not much happened.”

Some weeks I barely made expenses, and on others I carried passengers all week long at five dollars each.

– **Charles Lindbergh, We**

Offering to share income, Lindbergh invited Gurney to go barnstorming in his Jenny during the warm months of 1923. Gurney recalled hoping it would be an “adventure.” It was.

“We left to barnstorm in Ashland, Nebraska,” Gurney said. “[Lindbergh] left a carborundum can on the magneto distributor, or by it—and it lay between the cylinders.” Lindbergh’s face must have shown surprise, because Gurney laughed.

“And [it] shorted out the magneto. We had a forced landing. He landed in an open field. We got on top of the engine to see what was wrong with it, and lifted out this carborundum can, and of course the engine ran perfectly after that. He’s forgotten about that! Do you remember now?”

Lindbergh was succinct: “No, I don’t re-

member it.” “You don’t?” asked Gurney. “Oh, you should remember that. I sure do.”

The rest of their “adventure” included a desperate attempt to keep the Jenny from blowing across a pasture during a sudden thunderstorm.

Gurney’s account of being knocked unconscious for several minutes by lightning is prefaced with a disclaimer:

“I don’t know if I’m going to have much agreement with Charles Lindbergh on this, but this is the way I remember it.

“I was holding on to the stabilizer wires underneath the tail of the airplane.... The thing I remember next—which seems strange to me that [Lindbergh] doesn’t—[is] that I was lying in about three inches of water...and Charles Lindbergh...said to me, ‘Did you feel that little shock?’”

Neither backed off his version, but eventually Lindbergh conceded that Gurney “may have gotten a worse shock,” to which Gurney gracefully concluded, “I don’t know.... At any rate, it wasn’t a very successful barnstorming trip.”

There were several forced landings in Lindbergh’s Jenny, and it is amazing that the only serious injury was to Gurney while he was performing a parachute jump after the International Air Races in St. Louis in October 1923.

Lindbergh and Gurney traveled separately to the races, where they stood among



Gurney stayed in aviation, becoming a captain with United Airlines and a restorer of vintage aircraft.

140,000 spectators and watched biplanes roar around pylons at 200 mph. Both found the spectacle exhilarating, but, said Gurney, "it couldn't all be fun. There was work to be done." Gurney was promised \$50 for a parachute drop over the grandstand, money that would allow him to return to school. Lindbergh agreed to carry Gurney aloft in his Jenny. When Gurney jumped from the Jenny, he dropped into the slip stream of another aircraft, and his parachute collapsed. While spectators watched, Gurney fell to the ground.

"I hit it...more or less horizontally, and...broke [a] bone in one arm and did some damage to the socket. [I] put the parachute over my shoulder...and I walked across the field, and I almost made the hospital tent one quarter mile away. Almost. When I woke up I was in an ambulance, and Charles Lindbergh was beside me."

For three weeks, Gurney had one daily visitor—his friend Slim. When Gurney felt strong enough to leave the hospital, he had no way to settle his bill. "They weren't going to let me out," said Gurney. "After all, I wasn't a charity case. I'd won quite a bit of money at the St. Louis Air Races although I hadn't collected it. And they had no way of collecting the money, so I had to collect it. And guess who I collected it from? Charles Lindbergh!"

"[P]rior to entering Barnes Hospital in St. Louis, I'd met a boy named Francis Stimson.... I introduced him to Charles Lindbergh. While I was in the hospital, Charles Lindbergh sold his Jenny to Francis Stimson and was teaching him to fly."

Because Gurney's accident and the sale of Lindbergh's Jenny happened so close together, some historians have speculated that Lindbergh sold his Jenny to pay Gurney's hospital bill. However, aviation historian Chet Peek, who has reviewed the unedited manuscript of *The Spirit of St. Louis*, says that Lindbergh was paid for his Jenny on November 14, 1923, long after Gurney had left the hospital. It's possible that the money Gurney collected from Lindbergh was Gurney's own prize money, which Lindbergh retrieved for him.

In 1969, Gurney (left) and Lindbergh flew together for the last time, taking off in Bud's Gipsy Moth. Lindbergh died in 1974; Gurney in 1982.

No need to worry about [Gurney] – clear head – steady nerves – agile as a monkey. – Charles Lindbergh, *The Spirit of St. Louis*

Gurney spent that fall picking up odd jobs around the St. Louis airfield, and doing aircraft repair work Lindbergh referred to him. Lindbergh's mother, Evangeline, visited at Christmas; Gurney recalled, "Mrs. Lindbergh...had never seen a wing-walking show, and Slim and I made up our minds we'd show it to her."

Gurney confessed that he was "very much taken" with Mrs. Lindbergh. "I thought she was about the most perfect woman in the world. And she was."

With Gurney still wearing a steel brace on his arm, Lindbergh took him aloft. Using one arm to balance on the wing of the "decrepit" Jenny, Gurney managed to get through several stunts before his threadbare pants were blown apart at the seams.

"[T]hinking as much as I did of Charles Lindbergh's mother, having this disgraceful show...having no pants on—they just hung onto the belt and flew in the slip stream. Nothing on but a thin pair of shorts!"

"I tried to get back in the cockpit, and you know, for some reason that Jenny went out of control. It went up and down and

crossways and every time I tried to dive for the cockpit there were forces generated that kept me from getting into that cockpit! And I've always suspected that Charles Lindbergh had a hand in those crazy maneuvers."

Gurney concluded, "Well, as much as I already thought of Evangeline Lindbergh, I thought what a wonderful sense of humor she had. I think no comedians could have put on a show like ours."

Lindbergh's biographical accounts of his reckless "adventures" are sometimes minimalistic, almost to the point of denial. There were probably few people in the world who would challenge Charles Lindbergh. But in this taped account, it is obvious that Gurney has no such inhibitions. With diplomacy based upon mutual respect and friendship, Gurney holds firm even when Lindbergh disagrees.

It is tantalizing to imagine further interviews in which Gurney describes his years with Lindbergh as an airmail pilot for Robertson Aircraft Company in St. Louis during the mid-1920s, or their lives together and apart after Lindbergh became the most famous man in the world.

It is a loss to history that, like so many pioneer aviators of the Golden Age, Gurney did not write his autobiography. Yet, thanks to Charles Lindbergh, we have at least one chapter. ✈



Sightings

PICTURES WORTH A SECOND LOOK



"TOOLS CHANGE," says Smithsonian photographer Dane Penland, who long ago made the switch from film to digital. "But the way you compose an image doesn't change. And lighting is everything." That's certainly true when shooting in the National Air and Space Museum's cavernous Steven F. Udvar-Hazy Center in northern Virginia, where Penland is the resident photographer. There, strobe lights are key to his work.

Take the Fowler-Gage Biplane (left, top), which owner Robert Fowler flew 52 miles nonstop across Panama in April 1913. In December 2006, a photo shoot began with the biplane's propeller.



“Editors are always looking for verticals of aircraft,” says Penland, “but they never work as verticals. It was the prop that provided [a vertical shot], and then I just kept going with it.” He used a Nikon D2X at relatively high shutter speeds, 1/160th to 1/200th of a second, to keep the background dark as the strobes flashed.

A vertical of the Northrop N1M Flying Wing (opposite, bottom), shot in September 2003, worked only when Penland got high up. He used a Mamiya RZ67 film camera and an accessory that converts it to a digital tool. “You see the shape, bright leading edge, and shadow, and the cockpit sticks out. If I had lit it directly from the top, you wouldn’t see the shape,” he says.

The Fulton Airphibian FA-3-101 (above), which in 1950 became the first road-capable aircraft approved by the Civil Aeronautics Administration, arrived at the Museum in July 2009. Penland was waiting with a Hasselblad HD3, a 31-megapixel monster that takes photos at around 100 megabytes each, offering razor-sharp resolution.

“A lot of my photos throughout the Institution, after 30 years, are portraits rather than just a documented shot,” says Penland. “They say, ‘This is something important. It belongs here.’”

Then & Now

FROZEN MOMENTS AS TIME MARCHES ON

Joy to the World

HAD THE YEAR 1968 not been so tumultuous—with assassinations, riots, and the war in Vietnam—the first Americans to spend Christmas in space might have been remembered for a more light-hearted celebration. NASA had asked the Apollo 8 crew, which launched on December 21, to do something “appropriate” for a live TV downlink on Christmas Eve. Astronaut Jim Lovell had considered a reading of “The Night Before Christmas” or the lyrics to “Jingle Bells.”

Instead, Lovell, commander Frank Borman, and Bill Anders took turns reading the first 10 verses from *Genesis* as their spacecraft circled the moon. An estimated one billion people heard or saw the electrifying broadcast. The first human-made video of the moon showed the ancient body, with the Biblical story of creation as the



soundtrack. “This was a great inspiration, not just to us but for all the world,” says Lovell. “We wanted the year to end on a positive note.”

The astronauts raised viewers’ spirits, even though conditions aboard the cramped spacecraft weren’t the merriest. Borman’s space-sickness made living there, as Anders later told PBS, “like being in an outhouse.” Still, Apollo 8 was the first to have moisturized meals that could be eaten with a spoon.

Today, on the roomier, cleaner, and fresher-smelling International Space Station, there’s always someone in space on Christmas Day (and all other religious holidays).

Expedition 16 played Santa for Christmas 2007. From left: Yuri Malenchenko, Peggy Whitson, and Dan Tani.

Given the troubles of 1968, says Jim Lovell, “a Bible reading was the right thing” for that Christmas in space.

The international crews represent many religions, so for Christmas, they tend toward secular celebrations, with a small fireproof tree, stockings, and Santa hats as decorations. Because the workload is usually light (Christmas Day is a federal holiday for NASA astronauts), there’s generally time to talk via radio with family on Earth.

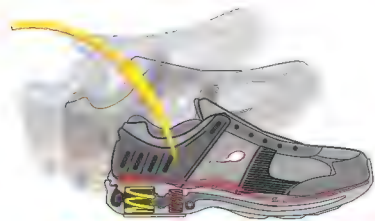
“We tried to cobble ahead a dinner of smoked turkey, mashed potatoes, and stuffing,” in part from Thanksgiving rations, says Dan Tani, who spent four months on the station in 2007 and 2008. “Then we opened our presents, played with our toys, and ate our candy.” The gifts had arrived earlier in a package from a visiting space shuttle. Like any good parent, station commander Peggy Whitson had dutifully hidden them in a bag in her berth until the big day arrived.

ROGER A. MOLA

NASA (2)



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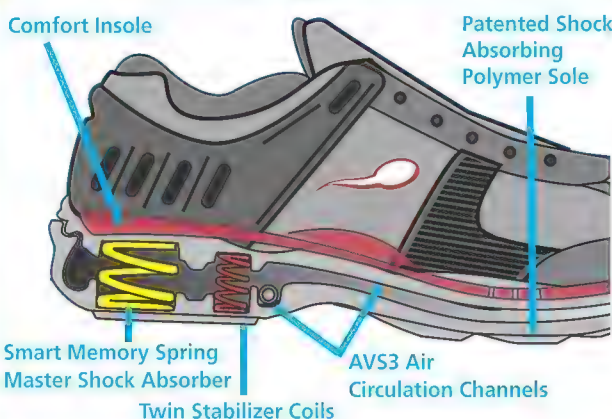
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Portrait of the Artist

A new book shows why Gil Cohen excels at painting airplanes, and the pilots who fly them.



Gil Cohen: Aviation Artist

by Gil Cohen. Boston Mills Press, 2009. 144 pp., \$49.95.

PHILADELPHIA-BORN GIL COHEN

launched his career as a 10-year-old sketch artist on the boardwalk in Atlantic City, New Jersey. He went on to spend four years at an art school, then earned a journeyman's reputation producing cover illustrations for everything from men's adventure magazines and paperback thrillers to Harlequin romance novels. As the title of the book suggests, however, the role that has always been closest to Cohen's heart is that of aviation artist.




All artists of this genre pride themselves on accurate depictions of flying machines in action, and Cohen is no exception. What sets him apart from other masters, however, is his focus on the human element. Not content to simply depict Hurricanes and Spitfires in

the air, the artist gives us "Gentlemen, As You Were," catching Air Chief Marshal Hugh Dowding in conversation with young fighter pilots at a Royal Air Force base. And rather than showing massed bomber formations, Cohen provides an intimate view of a Lancaster crew over Germany at night as seen from the wireless operator's station ("We Guide to Strike").

In "Return to the Bump/Biggin Hill, Summer 1940," a British fighter pilot is debriefed after a mission.

At his best, Cohen brings history to life. In "The Wrights at Huffman Prairie," Wilbur and Orville look up from their work on the world's first practical airplane as sister Katharine arrives with a picnic basket. The sun is shining on the prairie grass. Purple coneflowers dot the foreground. It is as though we are there.

Cohen is a master illustrator. This is a volume that will find a place on my bookshelf, rather than migrating to the nearest used bookshop.

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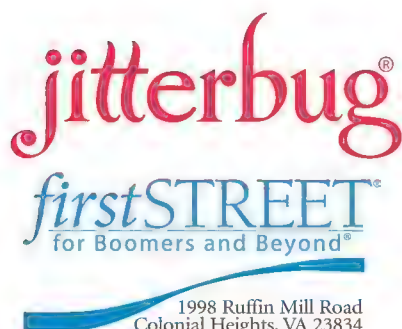
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>>> Excerpt <<<

The Private Amelia

Amelia Earhart: The Thrill of It

by Susan Wels. Running Press, 2009. 208 pp., \$35.

IN THE LATEST OF MANY BIOGRAPHIES OF AMELIA EARHART, Susan Wels illuminates the aviator's personal life by drawing from the diaries of Dorothy Putnam, the first wife of Earhart's manager and eventual husband, George Palmer Putnam. On June 17 and 18, 1928, Earhart became the first woman to fly across the Atlantic. She was only a passenger, but the flight catapulted her to worldwide fame.

G.P., as Earhart referred to Putnam, insisted she write a book to capitalize on her celebrity. For six weeks, Earhart moved into the sprawling Rye, New York home of Putnam and Dorothy, where she wrote the manuscript for *20 hrs. 40 min.: Our Flight in the Friendship*. The following excerpt is from a chapter entitled "The Hero Business."

It was "all very hectic and upsetting," Dorothy complained, with large crowds for meals and reporters hovering about, but it was "all in the game," she acknowledged, and she and Amelia, on the surface at least, remained great companions. When Amelia wasn't writing her book or answering the piles of fan letters that poured in—about two hundred a day—she and Dorothy liked to go driving or shopping, and they went swimming together most afternoons. Dorothy adored airplanes, and



Amelia took her up in her new little Avian Moth, which had been crated and shipped back to the United States, flying the "small silver darning needle" of a plane in the bracing ocean air off Long Island Sound.

As the days passed, however, there were undercurrents of tension. Dorothy was irked by G.P.'s constant attention to Amelia; they were hardly ever apart—working together in the house, canoeing and swimming together for hours, and planning the next stage in Amelia's career. Dorothy and G.P. had only a shell of a marriage—she was madly in love with a man nineteen years younger, and "utterly indifferent" to her husband—but G.P. and Amelia were inseparable under her own roof, and she found it galling.

Amelia, for her part, was torn between her friendship with Dorothy and her growing attachment and attraction to G.P. When she completed the first draft of her *Friendship* account, entitled *20 Hrs. 40 Min.*, she told Dorothy that she wanted to dedicate the book to her. Dorothy was instantly skeptical about Amelia's motives. "Does she really want to?" she wondered in her diary. "Or was it a sop to me because she had monopolized George all summer?" Dorothy wasn't the only one who noticed the growing closeness between G.P. and Amelia. Rumors of a romance were starting to spread, and by August 21, as Dorothy watched them together from afar, she realized that they had suddenly become a couple.



Top to bottom: Amelia Earhart became George Putnam's obsession; in Honolulu before a solo flight to California; pilot of an autogyro in 1931.

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Reviews & Previews

Flying From the Black Hole: The B-52 Navigator-Bombardiers of Vietnam

by Robert O. Harder. Naval Institute Press, 2009. 336 pp., \$34.95.

THE WHITE-HOT BLAST of a surface-to-air missile's fragmentation warhead marks the climax of Robert O. Harder's tribute to Vietnam-era B-52 combat crews. The author flew 145 combat missions in the "Black Hole" of the title: the deafening, cramped workplace of the two men responsible for putting a B-52's bombs precisely on target. In this dark hell of screaming turbines and teeth-jarring turbulence, the navigator and radar navigator (bombardier) guided their crew to the bomb release point. Their tools: a late-1950s radar set and an electromechanical, analog bombing computer, complete with knobs, pulleys, and vacuum tubes.

Like a B-52 on takeoff roll, *Black Hole* takes a while to build momentum: It lingers too long on the history of aerial navigation and bombing, the origins of the Strategic Air Command, and navigator training curricula. But Harder uses the buildup to the 1972 Linebacker II bombing campaign to craft a larger portrait of the SAC crew experience, from cold war alerts to hot bombing runs over Vietnam.

During Linebacker II, the Air Force lost 15 B-52s, and 33 Stratofortress crewmen were killed or declared missing. But Harder shows that crews overcame SAC's initial by-the-book tactics and Hanoi's defenses to win the climactic air battle over North Vietnam. I learned more about the discipline and tactics of B-52 crews over Hanoi from this book than I did from flying the B-52 a decade later.

TOM JONES IS A FORMER B-52D AIRCRAFT COMMANDER AND NASA ASTRONAUT.



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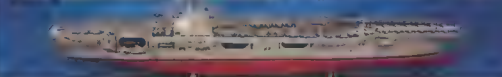
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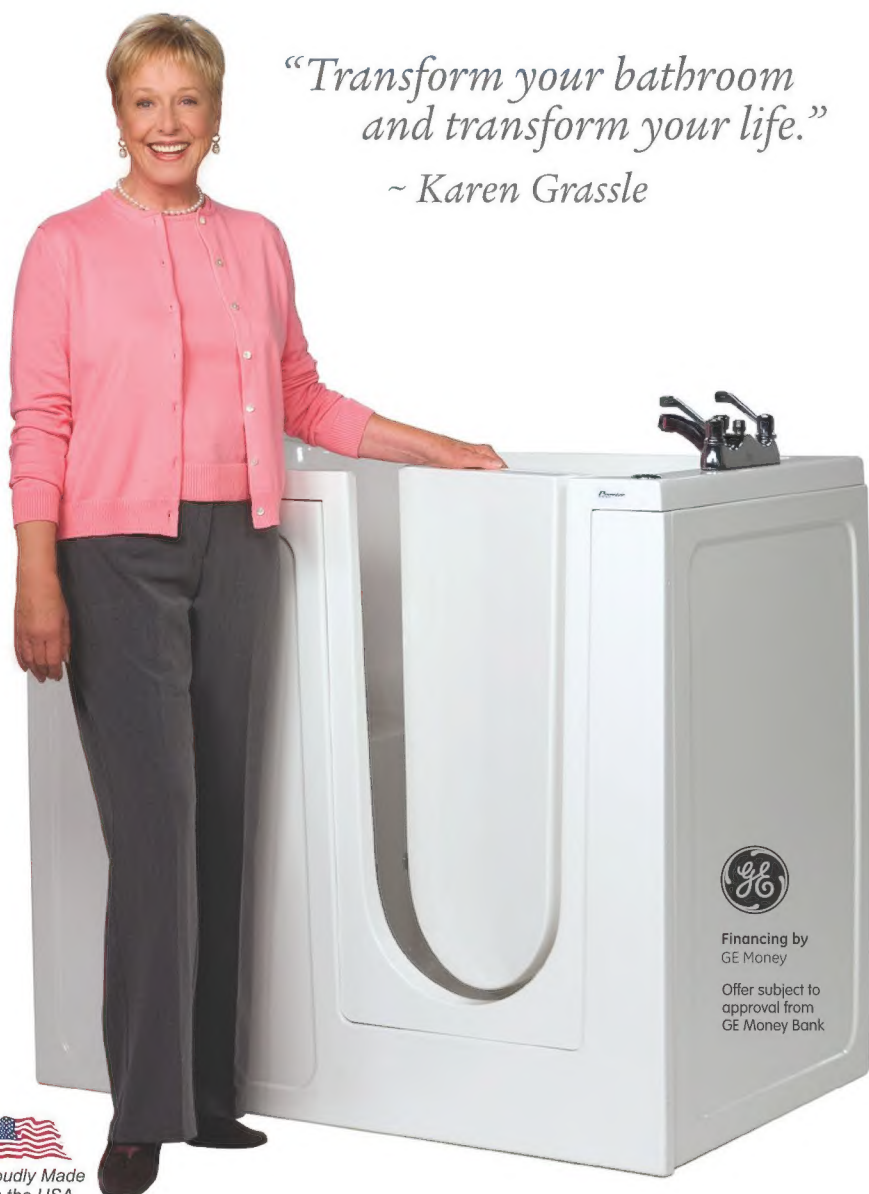
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Credits

Adventures in the South China Sea. Aviation writer Tracy Wilkinson is also a commercial helicopter pilot.

Like Father, Like Daughter. David Unekis lives in Lawrence, Kansas.

Thanks for the Memories. Rebecca Maksel is an associate editor at *Air & Space/Smithsonian*.

Space Shuttle Jr. Michael Klesius is an *Air & Space* associate editor.

The Big Race of 1910. Don Berliner is a writer in Alexandria, Virginia.

The Do-Everything Bomber. John Aldaz and Sir George Cox have collected hundreds of original aircraft manufacturer models.

Super Tweet. Frequent contributor Stephen Joiner writes about aviation from his home in southern California.

Ode on a Canadian Warbird. Bruce McCall is a writer and illustrator whose work frequently appears in the *New Yorker*.

Soviet Star Wars. Dwayne A. Day is a program officer with the Space Studies Board of the National Research Council. Robert G. Kennedy III is president of Ultimex Group Inc., in Oak Ridge, Tennessee.

Deadstick Landings. Tom LeCompte's story on vertigo, "The Disorient Express" (Aug./Sept. 2008), won a 2009 Aerospace Journalist of the Year award.

Restoration: Kentucky Panther. Barrett Tillman's next book is *Whirlwind: Bombing Japan 1942-45*, due from Simon & Schuster in March.

Slim & Bud. Giacinta Bradley Koontz is an aviation historian.

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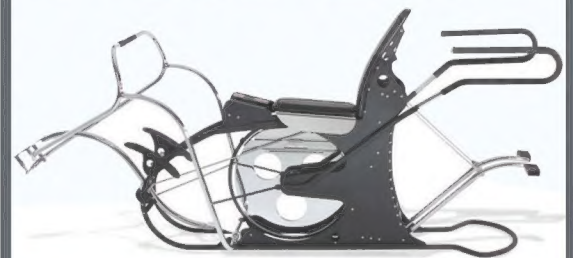


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Swept wings are nothing new, but one lesser known fact about them is that when it comes to making the wing appear thin to the air, sweeping the wings forward is as good as sweeping them aft. And forward sweep has advantages. At high speed, the air passing over conventional aft-swept wings tends to flow out to the wingtips, a phenomenon called spanwise flow. The air piles up near the wingtips and makes the ailerons ineffective, so designers install wing fences and use a number of tricks to block this flow. Sweep the wings forward and the air flows in toward the fuselage. Problem solved.

Forward sweep also allows the spar box, to which the wings are anchored in the fuselage, to be located farther aft, where it's out of the way of the cabin or a pressure bulkhead; that's good. But few airplanes have been built with forward sweep. This is because forward sweep also has a disadvantage. When an airplane turns and applies high G-loads on forward-swept wings, their tips bend upward and, as they do, the leading edges twist upward too, increasing the angle of attack. If the twist goes too far, the wing fails structurally; that's bad. To counter that

tendency, wings with forward sweep had to be exceedingly stiff and therefore heavy—until the X-29.

NASA and the Air Force conceived the X-29 as a way to explore forward sweep, and Grumman built two. First flight was 25 years ago, in December 1984. Development of the X-29 also marked the end of an era, as piloted X-aircraft for pure research—as



Hello HAL: Pilots needed a computer to fly Grumman's X-29.

distinguished from military prototypes—became scarce. (There have since been only three: the X-31, X-49, and X-53.) To build the X-29, Grumman modified a Northrop F-5's forward fuselage and mounted composite wings on it. The layers of composite fibers were tailored so that as the tips bent upward, the wing's leading edge twisted down, countering the nasty tendency of the wing to diverge and fail. The main gear came from an F-16, and its engine, a General

Electric F404, powered the F/A-18, the stealthy F-117, and many others.

The X-29 also had a forward control surface, a canard, which rendered the airplane completely unstable. No human pilot could manage it without help, which came in the form of three computers that constantly adjusted the control surfaces. It happened so fast (about 40 Hertz) that the airplane

appeared to have a bad case of coffee nerves, but it felt stable. Why three computers? If one malfunctioned, it was outvoted by the other two. And the computers were backed up by a three-channel analog system. The X-29 program, which ended in 1992 with the airplanes' retirement, succeeded in providing an engineering knowledge base and proved that forward sweep confers efficiency in level flight and good manners during extreme maneuvers. Despite its success, forward sweep has not been applied to any

production military or civil aircraft except the HFB 320 Hansa Jet, a business jet that was built by Hamburger Flugzeugbau in Germany until 1973.

Both X-29s survive. One is at the National Museum of the U.S. Air Force in Dayton, Ohio, and the other at NASA's Dryden Flight Research Center in California. The National Air and Space Museum on the National Mall has a full-scale mockup in the Beyond the Limits gallery, a permanent exhibit that examines the role computers play in modern flight.

■ ■ ■ GEORGE C. LARSON, MEMBER, NAA

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